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# Abacus

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# EDITORIAL

> What has been is what will be, and what has been done is what will be done; there is nothing new under the sun.
>
> —Attributed to King Solomon, Ecclesiastes, 1:9

A recent editorial began with reference to the first article published in *Abacus*, 'Financial Information and the Securities Market' (Chambers, 1965). That piece lamented that the paucity of quality information provided to investors resulted in gross inefficiency in the stock market. Concerns about the quality of accounting information continue in Australia and elsewhere (Chambers, 1973; Mattessich, 1995; SEC, 2001). The 2001 Royal Commission into the collapse of one of Australia's largest insurance companies, HIH, caused this response in the financial press: 'Did window-dressing of accounts involve serious breaches of the law?' To Chambers' dismay it might be inferred that some window-dressing (creative accounting or earnings management) presumably does not! Chambers would probably have mused that the essence of his 1965 article was not well understood. His article was in response to public concerns about accounting artefacts, such as provisioning policies for bad debts and various types of capitalized expense techniques (producing deferred bookkeeping debits) used by many retail and finance sector companies in the 1950s and 1960s. The current brouhaha in Australia's press relates to similar issues—for example, the appropriateness of provisioning policies, this time covering future insurance claims, and the booking of future income tax benefits as an asset. The HIH Royal Commission is set against a backdrop of whether the reported accounting numbers relying on those accounting artefacts provide reasonable indicators of an entity's solvency. The perception by many to treat financial position and solvency as synonyms continues.

A similar situation exists in the U.S. Consider recent banner headlines in U.S. business journals, such as *Business Week*'s 'The Earnings Game: Everyone Plays, Nobody Wins' and 'Confused About Earnings?', and others that have appeared in *Barron's*, *Forbes*, *Harvard Business Review*, *Wall Street Journal*, as well as observations made in reports like the Levy Institute Forecasting Center Special Research

Report dated September 2001, 'Two Decades of Overstated Corporate Earnings', and imply that earnings management (creative accounting or window-dressing) is flourishing in the U.S. Byrnes and Henry (2001) observe that there is uneasiness over the use by corporations of 'aggressive accounting practices' and 'pro forma' earnings figures in their financial report alongside earnings figures calculated using GAAP. This, *inter alia*, reportedly caused the former chairman of the U.S. Federal Reserve, Paul Volcker, to observe that 'auditing and accounting is in crisis' (Byrnes and Henry, 2001). The observation has appeared often, most recently in the U.S.A. following the litigation blowout in the early 1990s (Mattessich, 1995, pp. 3*ff*.). Uneasiness with earnings management practices underpinned the seventh R. J. Chambers Research Lecture delivered by Walter Schuetze, former chief accountant of and current consultant to the Securities Exchange Commission. Delivered on 27 November 2001 in the Great Hall of the University of Sydney to an audience of more than 250 people, Schuetze (2001b) made a stinging attack on how the accounting profession has allowed the earnings management disease to fester for several decades. The lecture drew on ideas that had been published in Schuetze's *Abacus* article (Schuetze, 2001a), 'What Are Assets and Liabilities? Where Is True North? (Accounting That my Sister Would Understand)'. This extract from Schuetze (2001b) captures the Schuetze *leitmotif*:

> Corporations today continue to manipulate their earnings without objection from their external auditors. SEC Commissioner Hunt in a speech on October 26, 2001 discussed earnings management. (See www.sec.gov.) *Business Week*, in the July 23, 2001 issue on page 71 says, 'In today's financial climate, auditor's reports have about as much credibility as buy recommendations from Wall Street analysts.' The June 2001 issue of the *Harvard Business Review* has a twelve-page article entitled 'The Earnings Game: Everyone Plays, Nobody Wins.' On Friday night, October 19, 2001, on a TV program called 'Wall Street Week,' I heard and saw a prominent Wall Street investment manager say something along the following lines: 'Corporations are writing off assets right and left in the quarter ended September 30, 2001. Comparative earnings statements in 2002 will be wonderful.' His implication was that the write-downs are arbitrary. The Levy Institute Forecasting Center, in a Special Research Report dated September 2001, describes in twenty-three pages of detail 'Two Decades of Overstated Corporate Earnings,' which its chairman, Mr. David Levy, previewed on TV on CNBC on October 24, 2001. *Business Week*, in the October 15, 2001 issue on pages 46 and 47, reports: 'Brace yourself for what may be the ugliest quarter ever for corporate earnings. For years, companies used every trick in the book to make their results look better than they really were. Now, many will be taking the opposite tack: loading costs and charges onto their income statements in an all-out effort to make an already horrid year look even worse. To make next year's results look stronger companies may load losses into 2001 by: slashing values of physical assets, which will cut depreciation charges in the future; overestimating likely bad debts, thus boosting future profits when customers pay up; and charging impending restructuring costs immediately, so as to benefit if they're less than expected.'
>
> It's not just in *Business Week* and the *Harvard Business Review*. I see it in *Forbes*. I see it in *Barron's*. I read the earnings reports of corporations on their websites and in the *Wall Street Journal*, and I see the earnings management. It is going on in bright daylight, and not behind closed doors. Everyone on Wall Street knows it is going on. The Stock Exchanges know it is going on. The SEC knows it is going on. Every sell-side security analyst knows it is going on. Every institutional investor knows it is going on. But, the individual investor who is not part of the Wall Street in-the-know crowd doesn't know it

> is going on. John and Jane Q. Public don't know it is going on. Maybe members of Congress don't know it is going on. The external auditors can't stop it. Even if the external auditors were US Federal government auditors, whose independence would be unquestionably pure, they could not stop it because the accounting rules allow for earnings management. External auditors have no ground on which to stand to stop it because of the way the accounting rules are constructed. The Stock Exchanges can't stop it. Because the accounting rules allow for earnings management, the SEC can't stop it through its Division of Corporation Finance, which reviews and clears registration statements and other filings by issuers of securities. The SEC's Office of Chief Accountant and Division of Enforcement can't stop it because the accounting rules allow it. I could not stop it when I was Chief Accountant at the SEC.

Schuetze observes that in the fallout from failures like the U.S.A.'s Enron there is 'nothing new under the sun'. Official enquiries follow those failures, revealing some specific deficiencies in auditing and accounting practices, like the need to tighten aspects of audit independence. But reliance on the conventional underlying historical cost system persists.

Clearly, there is still much to be explored regarding creative accounting (earnings management or window-dressing) notwithstanding ongoing complaints extending over nearly one hundred years (Clarke *et al.*, 1997, especially ch. 2) and the numerous academic and regulatory enquiries that have resulted. The responses by various parties to this issue appear to be in an intellectual groove. Accounting practitioners still bemoan that there is no real evidence of any problem with the quality of fundamental accounting and auditing practice—rather, the problem is in the expectations of the users. They say the solution is to educate the users on the 'limitations of accounts'—a plea made by the leading U.S. practitioner G. O. May in the mid-1930s (May 1936). On the academic front the articles on earnings management generally seem to concentrate on providing evidence and related explanations as to *why* earnings management occurs. A laudable exercise—but it is only a partial aid in resolving the problems associated with earnings management. The issue of whether earnings management should exist is not systematically addressed—perhaps such normative issues are perceived as too difficult. There is an opportunity for all interested parties, practitioners, regulators and academics to provide input to the literature addressing the current divergence of views. To maintain its credibility the discipline needs to undertake research that accommodates some form of convergence on the related issues of earnings management and audit quality. Perhaps there may then be some systemic changes to the extant system of accounting that will lead to a more serviceable financial reporting system.

*Graeme Dean*
*University of Sydney*
*January 2002*

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HAIM A. MOZES

# The Value Relevance of Financial Institutions' Fair Value Disclosures: A Study in the Difficulty of Linking Unrealized Gains and Losses to Equity Values

This article provides a residual-income valuation framework for assessing whether fair value disclosures required by SFAS 119, *Disclosures About Derivative Financial Instruments and Fair Values of Financial Instruments*, are value-relevant. The primary theoretical and empirical result is that when using a residual-income valuation model, the estimated relation between variables measuring fair value-book value differences for financial instruments and security prices may be contrary to what one would have expected. Specifically, the greater the firm's return on invested capital and growth rate relative to its cost of capital, the more *negative* the estimated relation between fair value-book value differences for financial instruments and security prices. A generalization of this result is that tests linking equity values to various types of unrecognized gains and losses are, in many cases, unlikely to generate the hypothesized positive relation between equity values and the unrecognized gains and losses.

**Key words:** Disclosure; Fair value; Financial institutions.

When market values of assets differ from historical cost, the present value of expected future cash flows cannot be derived from the assets' book value. This difficulty has motivated standard-setters' attempts to require additional information about asset and liability market values. Examples of such efforts in the U.S. are SFAS 33, *Financial Reporting and Changing Prices*; SFAS 39–SFAS 41, *Financial Reporting and Changing Prices: Specialized Assets*; SFAS 69, *Disclosures About Oil and Gas Activities*, and a number of more recent standards (e.g., SFAS 105, SFAS 107 and SFAS 119) which require increased disclosures about the fair values of financial instruments.[1]

[1] In SFAS 33, *Financial Reporting and Changing Prices*, the FASB's focus was on the required disclosure of expense measurements using current costs. However, SFAS 89, *Financial Reporting and Changing Prices*, effectively rescinded SFAS 33.

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Because financial instrument disclosures may impose considerable costs on financial institutions (e.g., Lee, 1992; Higgins, 1996),[2] an important question is whether the financial instrument disclosures mandated by the FASB in SFAS 119, *Disclosures About Derivative Financial Instruments and Fair Values of Financial Instruments*, meet the FASB's cost-benefit criteria for issuing new standards. In particular, are data in the SFAS 119 disclosures value-relevant in the sense that they are related to equity values? If the FASB's detailed disclosure requirements for financial instruments are not value-relevant, there would be less motivation for other standard-setting bodies, such as the IASC, to adopt similar disclosure requirements for financial instruments.[3]

Intuitively, one would expect data on current values to be value-relevant. However, nearly two decades ago Beaver *et al.* (1982) found that SFAS 33 current cost data do not help explain cross-sectional differences in security prices, and Bernard and Ruland (1987) found that SFAS 33 current cost data help explain time-series differences in security prices for only a small subset of firms. Magliolo (1986), Doran *et al.* (1988), Harris and Ohlson (1987), and Ghicas and Pastena (1989) all conclude that SFAS 69 disclosures on oil and gas property values are not value-relevant.

In addition, previous research on the value-relevance of fair-value disclosures for financial instruments provides conflicting results. Consider Beaver *et al.* (1989) finding that disclosures about non-performing loans and the interest-rate structure of loans help explain cross-sectional differences in market-to-book ratios; Barth *et al.* (1991) finding that relatively little of the disclosed information about loan portfolios is value-relevant; Nelson's (1996) failure to find a relation between the fair value disclosures required by SFAS 107 and financial institutions' equity values, after controlling for earnings; Barth, Beaver *et al.* (1996) finding that SFAS 107 disclosures of items other than marketable securities are value-relevant; and Eccher *et al.* (1996) finding that the only value-relevant SFAS 107 fair-value disclosures are those pertaining to marketable securities.

This article uses a residual-income valuation model as a framework for designing and interpreting empirical tests linking equity values and the SFAS 119 disclosures on fair value-book value differences for financial instruments, and to demonstrate the value-relevance of SFAS 119 fair value disclosures for financial instruments. The basic insight revealed is that while the earnings generated by the differences between fair values and book values of financial instruments are included in historical-cost-based income, those differences also affect the cost-of-equity-capital charge used to calculate residual income. As a result, when using a residual-income valuation model, it is possible that the estimated relationship between the variable representing the differences between fair values and book values of financial instruments and the market value of equity will be negative.

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[2] These possible costs relate to the economic consequences of the disclosures rather than to the costs of computing and preparing the financial disclosures.

[3] A particular disclosure is useful if the information conveyed by the disclosure is not conveyed to the market through other information sources *and* the information is value-relevant. Hence, information can be value-relevant but not useful if investors obtain the data earlier or at lower cost from other information sources. This article concentrates on the value-relevance of SFAS 119 disclosures. The appropriate method for analysing the usefulness of these disclosures would be an event-study centered around the release of the Form 10-K.

Evidence is provided that the SFAS 119 disclosures are value-relevant. However, the direction of the estimated relation between financial instrument fair values and equity values is contrary to what one would expect, and the relation differs for low growth and high growth firms. A generalization of this result is that test designs using a residual-income valuation model to link equity values to various types of unrecognized gains may not generate the hypothesized positive relation between equity values and the unrecognized gains, even if the unrecognized gains are, in fact, positively related to equity values.

## MODELLING THE VALUATION IMPACT OF FAIR VALUE DISCLOSURES

Residual-income models provide a logical mechanism for linking earnings and book values to equity values. Using the clean surplus relation, Peasnell (1982a, 1982b) shows that the difference between the firm's book and market values equals the present value of future residual income. Employing a number of assumptions concerning the relation between past and future residual earnings, Feltham and Ohlson (1995) derive the general structure of the following valuation model, as well as closed-form solutions for the theoretical value of the model's coefficients.

$$MV_t = A + \alpha X^a_t + \lambda BV_t + \delta O_t \tag{1}$$

where $X^a_t = NI - PD - r(BV_{t-1}/2 + BV_t/2)$,

$MV$ is the market value of equity,
$BV$ is the book value of equity,
$X^a$ is residual earnings,
$r$ is the cost of capital,
$\alpha$ is the valuation multiple for residual earnings,
$\lambda$ is the effect of accounting conservatism on book value,
$NI$ is net income,
$PD$ is preferred dividends,
$O$ is other value-relevant non-accounting information, and
$A$ is a firm-specific intercept term.

Feltham and Ohlson argue that because accounting conservatism may understate book values, it is possible that $\lambda > 1$. According to the information dynamics assumed by Ohlson (1995) and by Feltham and Ohlson (1995), the maximum value for $\alpha$ is $1/r$. However, Myers (1999) and Dechow *et al.* (1999) find that, on average, the parameters for Model (1) estimated using either the Ohlson and Feltham and Ohlson information dynamics or a modified form of their information dynamics substantially underestimate the value of the parameters that are reflected in market values. Hence, even if Model (1) is the appropriate structure for modelling equity values, the estimated value for $\alpha$ may exceed $1/r$. In the remainder of the article, $\delta O_t$ is omitted because it is unobservable.

To incorporate SFAS 119 fair value disclosures into the valuation model, let FVBV represent the aggregate difference between the fair values and book values of financial instruments, and let UNREAL represent the unrealized gains/losses on available-for-sale marketable securities. In addition, $X_{bv,t} = (NI - PD)_t$; $X_{fv,FI,t} = FVBV_t - FVBV_{t-1}$; $X_{fv,MS,t} = UNREAL_t - UNREAL_{t-1}$. $X_{fv,FI}$ and $X_{fv,MS}$ represent the changes in the market value of financial instruments and marketable securities that do not flow through the historical-cost income statement (i.e., they are not in $X_{bv}$). The difference between $X_{fv,FI}$ and $X_{fv,MS}$, in U.S. GAAP for the sample period of 1996–7, is that $X_{fv,MS}$ appears on the balance sheet but not on the income statement, while $X_{fv,FI}$ does not appear on the balance sheet or on the income statement.[4] Adapting Model (1) to include the fair value disclosures provides the following valuation model[5]:

$$MV_t = \lambda BV_t + FVBV_t + \alpha(X_{bv,t} - r(BV_{t-1}/2 + FVBV_{t-1}/2 + BV_t/2 + FVBV_t/2)) + \gamma X_{fv,FI,t} + \omega X_{fv,MS,t} \qquad (2)$$

Noting that $FVBV_t = FVBV_{t-1} + X_{fv,FI,t}$ and rearranging terms:

$$MV_t = \lambda BV_t + \alpha(X_{bv,t} - r(BV_{t-1}/2 + BV_t/2)) + (1 - \alpha r)FVBV_{t-1} + (\gamma + 1 - \alpha r/2)X_{fv,FI,t} + \omega X_{fv,MS,t} \qquad (3)$$

Noting that $FVBV_t = FVBV_{t-1} + X_{fv,FI,t}$, $MV_t$ can also be expressed in terms of $FVBV_t$:

$$MV_t = \lambda BV_t + \alpha(X_{bv,t} - r(BV_{t-1}/2 + BV_t/2)) + (1 - \alpha r)FVBV_t + (\gamma + \alpha r/2)X_{fv,FI,t} + \omega X_{fv,MS,t} \qquad (4)$$

The $\gamma$ and $\omega$ parameters depend on the persistence of $X_{fv,FI}$ and $X_{fv,MS}$. The more positive the persistence of $X_{fv,FI}$ and $X_{fv,MS}$ the greater $\gamma$ and $\omega$, respectively. A reasonable scenario in which $X_{fv,MS}$ will have positive persistence is if marketable securities gains are persistent components of financial institutions' operations, and a percentage of those gains typically remain unrealized in the period they are earned. To the extent that financial institutions' operations are not geared toward maximizing $X_{fv,FI}$ and that financial instruments are fairly valued, there is no reason to expect $X_{fv,FI}$ to have positive persistence. Moreover, the events that lead to unrealized gains (losses) on financial instruments may also lead to decreased (increased) residual earnings in the future. For example, assume that the value of the firm's debt decreased (increased) during the year because market rates of interest increased (decreased), resulting in an unrealized gain (loss) on the financial instruments. However, the same increase (decrease) in interest rates may also lead to a reduction (increase) in the firm's net interest margin in the future, reducing future residual income.

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[4] As SFAS 133 became effective for U.S. GAAP for fiscal years beginning after 15 June 2000, most of $X_{fv,FI}$ will be reported in comprehensive income. For fiscal years beginning after 15 December 1997, SFAS 130 requires $X_{fv,MS}$ to be reported in comprehensive income.

[5] The explanation in Feltham and Ohlson (1995) for why the BV coefficient should not equal one is that there is a conservatism and a related measurement error in accounting book values. By definition, the conservatism and measurement error issue should not arise in a data item measured at fair value, without historical-cost accounting conventions. Therefore, the model assumes that the FVBV coefficient equals one, while allowing the coefficient on BV to equal $\lambda$. While the Ohlson model contains an intercept term and that term is reflected in equation (1), it is more meaningful in a time-series analysis than in a cross-sectional analysis. Specifically, it does not seem plausible that every firm, regardless of size, has an identical base value that is unrelated to book value or earnings. Therefore, the intercept term is dropped in equation (2).

FVBV represents the present value of the expected 'normal' earnings stream that the unrealized portion of the financial instruments will generate. Specifically, $E = rFVBV$ (or $FVBV = E/r$), where $E$ is the expected annual earnings generated by the unrealized fair value-book value differences. Clearly, a positive fair value-book value difference for financial instruments will increase the firm's value. Moreover, the greater the firm's return on equity, the greater the amount by which a one dollar fair value-book value difference in financial instruments will increase the firm's value.[6] However, in empirical tests of the residual-income model expressed in equations (3) and (4), the interpretation of the FVBV coefficient is that it represents the effect of fair value-book value differences of financial instruments on equity values, *after controlling for the historical cost income generated by those financial instruments*. Because the theoretical value of the estimated FVBV coefficient is $1 - \alpha r$, if residual income has a persistence of one (no growth, no decline), then $\alpha = 1/r$ and $1 - \alpha r = 0$. Hence, if, on average, residual-income has a persistence of one, the coefficient on the FVBV variable will approximate zero. On the other hand, if residual income is growing, $\alpha > 1/r$, $\alpha r > 1$, the coefficient on the FVBV variable $(1 - \alpha r)$ will have a *negative* value. The interpretation of the negative coefficient on the FVBV variable is that it represents, in part, the cost of capital for FVBV. It is only if residual income is declining that $\alpha < 1/r$, $\alpha r < 1$, and the FVBV coefficient $(1 - \alpha r)$ will be positive. That is, the estimated coefficient on the FVBV variable will be negatively related to the amount by which a dollar difference between the fair and book values of financial instruments increases the market value of equity.[7]

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[6] Using equation (4), this relation can be shown as follows. Since the unrecognized financial instruments' earnings contribute to accounting income $X_{bv,t}$ at the rate of $x(FVBV_{t-1} + FVBV_t)/2$, the overall effect on the market value of equity from FVBV is given by $\alpha x(FVBV_{t-1} + FVBV_t)/2 + (1 - \alpha r)FVBV_t$

Noting that $FVBV_t = FVBV_{t-1} + X_{fv,FI}$, we have

$$= \alpha x(FVBV_{t-1}) + \alpha x(X_{fv,FI})/2 + (1 - \alpha r)FVBV_{t-1} + (1 - \alpha r)(X_{fv,FI})$$

$$= (1 + \alpha(x - r))FVBV_t + (1 + \alpha(x/2 - r))X_{fv,FI}$$

Which is increasing in $x$.

[7] Writing the residual-income model in terms of beginning of the period book values, we have:

$$\begin{aligned} MV_t &= \lambda BV_t + FVBV_t + \alpha(X_{bv,t} - r(BV_{t-1} + FVBV_{t-1})) + \gamma X_{fv,FI,t} + \omega X_{fv,MS,t} \\ &= \lambda BV_t + \alpha(X_{bv,t} - r(BV_{t-1})) + (1 - \alpha r)FVBV_{t-1} + (1 + \gamma)X_{fv,FI,t} + \omega X_{fv,MS,t} \end{aligned}$$

Hence, the basic results are similar when using a residual-income model written in terms of beginning-of-the-period book values rather than average values throughout the period.

In summary, equations (3) and (4) generate the following empirical implications:

I1: The greater the persistence of residual earnings, the greater $\alpha$ and the lower the estimated coefficient for FVBV. Therefore, the subsample of high growth firms may provide evidence of SFAS 119 disclosures' value relevance through a significantly negative coefficient for FVBV. In addition, insignificant coefficient estimates for FVBV do not imply that SFAS 119 fair value disclosures are not value-relevant. Moreover, the estimated coefficients for FVBV cannot be meaningfully compared for different time periods or for firms with different expected growth rates.

I2: The estimated coefficient for $FVBV_{t-1}$ in equation (3) should be the same as the estimated coefficient for $FVBV_t$ in equation (4). Hence, it does not matter if beginning or ending fair value-book value differences are used to test the value relevance of SFAS 119 fair value disclosures.

I3: The estimated coefficient for $X_{fv,MS}$ should be greater than that for $X_{fv,FI}$ in both equations (3) and (4) even if $X_{fv,FI}$ and $X_{fv,MS}$ have equal persistence. Therefore, $X_{fv,FI}$ and $X_{fv,MS}$ should not be aggregated into one variable.

I4: In equation (4), the sum of the coefficient for FVBV plus two times the coefficient for $X_{fv,FI}$ equals $2\gamma + 1$, providing an indirect estimate of $\gamma$, and a method of testing if $\gamma = 0$ or if $\gamma = \omega$.

## DATA

This article focuses on the SFAS 119 disclosures, which improve upon the SFAS 107 and SFAS 105 financial instrument disclosures in two ways. First, the SFAS 119 disclosures are clearer than the SFAS 107 disclosures with respect to the sign of the difference between the fair values and book values for financial instruments. Venkatachalam (1996) observes that one shortcoming common to all studies using SFAS 107 disclosures is that a number of these disclosures are sufficiently vague for it to be possible to determine the direction of the fair value-book value differences. Second, information on a broader set of financial instruments is required by SFAS 119. For example, SFAS 119 requires information on derivative financial instruments even where the potential for accounting loss does not exceed the balance sheet amounts, while SFAS 105 and SFAS 107 do not. Due to the use of SFAS 119 data, the results here may not be comparable to results in previous studies.[8]

Because SFAS 119 was only fully effective for fiscal years beginning in 1996, there is a limited amount of data that can be gathered about the SFAS 119 disclosures.[9] Data were hand collected from the 1996 Form 10-Ks of banks and other

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[8] The data do not allow users to restate the SFAS 119 disclosures to what they would have been if the disclosures were based only on SFAS 105 and 107.

[9] Larger firms were required to implement SFAS 119 beginning in 1995 and smaller firms were required to do so beginning in 1996. In 1996, all firms were required to provide financial instruments data for the previous year as well, for comparative purposes.

TABLE 1

FAIR VALUE-BOOK VALUE DIFFERENCES FOR FINANCIAL INSTRUMENTS

| | $FVBV_{1996}$ | Absolute value of $FVBV_{1996}$ |
|---|---|---|
| Mean | 0.062 | 0.080 |
| Standard error | 0.016 | 0.015 |
| Median | 0.014 | 0.034 |
| Standard deviation | 0.160 | 0.151 |
| Sample variance | 0.025 | 0.023 |
| Kurtosis | 13.530 | 15.486 |
| Skewness | 3.416 | 3.742 |
| Range | 1.018 | 0.880 |
| Minimum | −0.138 | 0 |
| Maximum | 0.880 | 0.880 |

FVBV is the end-of-period market value minus the book value of financial instruments other than available-for-sale marketable securities, divided by the ending book value of equity.

financial intermediaries (a) whose primary business function is to provide either consumer or commercial credit, (b) with a year-end market capitalization of $500 million, and (c) who were independent companies for the entire fiscal year 1996. This sampling procedure eliminates brokerage firms and insurance companies, but retains non-depository lending institutions such as Money Store. There were 104 financial institutions meeting the sampling requirements and with available data on EDGAR and CRSP.

For each firm, the following data were gathered from the 1996 Form 10-Ks: Beginning and ending fair value and book value of financial instruments ($FVFI_{1995}$, $FVFI_{1996}$, $BVFI_{1995}$, and $BVFI_{1996}$), beginning and ending unrealized gains/losses on available for sale marketable securities ($UNREAL_{1995}$ and $UNREAL_{1996}$), beginning and ending book value of common equity ($BV_{1995}$ and $BV_{1996}$), preferred dividends ($PD$), common dividends ($CD$), net income ($NI$), and the beginning and ending amount of non-performing loans ($NONP_{1995}$ and $NONP_{1996}$). The aggregate difference between the fair values and book values of financial instruments, FVBV, is $FVFI - BVFI$.[10] The beginning and ending market value of equity ($MV_{1995}$ and $MV_{1996}$) were gathered from CRSP.

Table 1 provides distributional data for $FVBV_{1996}$, as a percentage of book equity. The results show that for 1996, the mean and median (absolute) values for the fair value-book value differences, as a percentage of book equity, are 6.2 and 1.4 per cent (8 and 3.4 per cent) respectively. The mean value of 6.2 per cent is significantly greater than zero at the 5 per cent level, implying that on average, fair values of financial instruments exceed book values.[11]

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[10] The fair value-book value differences for individual financial instruments are aggregated in FVBV, and no attempt is made to distinguish between the information provided by individual financial instruments' fair value-book value differences. However, if different financial instruments have different coefficients (e.g., Barth, Beaver *et al.*, 1996), the aggregation procedure may affect the study's implications.

*The Effect of Financial Instruments on Earnings Volatility*

Bernard *et al.* (1995) analyse the fair value disclosures required by Denmark's GAAP and find that for Danish banks, on average, return on equity calculated on a fair value basis is more variable than return on equity calculated on an historical cost basis. Barth, Landsman *et al.* (1996) find that fair value earnings in the U.S., using fair values only for marketable securities, are more volatile than historical-cost-based earnings. They conclude that the accounting items subject to market value accounting tend to increase rather than decrease the firm's volatility. Using a similar approach, the current study shows that the financial instruments subject to SFAS 119 market value accounting tend to increase intra-industry volatility regarding return on equity.

Three definitions are used to calculate return on equity. The first definition, *ROE_BV*, is simply net income to common shareholders divided by average shareholder's equity; the second definition, *ROE_ABV*, is net income to common shareholders divided by average adjusted shareholder's equity; and the third definition, *ROE_MV*, is calculated after adjusting earnings for unrealized gains/losses on both available-for-sale marketable securities and other financial instruments.

$$ROE\_BV_t = (NI - PD)_t \backslash [(BV_t + BV_{t-1})/2]$$

$$ROE\_ABV_t = (NI - PD)_t \backslash [(ABV_t + ABV_{t-1})/2]$$

where $ABV = BV + FVBV$.

$$\begin{aligned} ROE\_MV_t = {} & [(NI - PD)_t + (FVBV_t - FVBV_{t-1}) \\ & + (UNREAL_t - UNREAL_{t-1})]/[(ABV_{t-1} + ABV_t)/2] \end{aligned}$$

where $ABV = BV + FVBV$.

Univariate results comparing *ROE_MV*, *ROE_BV* and *ROE_ABV* are presented in Panel A of Table 2. The results show that mean return on equity is lowest with *ROE_MV*. Given that FVBV is, on average, positive, *ROE_ABV* is lower, on average, than *ROE_BV*. Results in Panel B show that, despite their differences, the three measures of ROE are highly correlated.

More importantly, the results in Table 2 show that market value-based ROEs are considerably more variable and skewed than historical cost-based ROEs, on an intra-industry basis. For example, the estimated cross-sectional variance for *ROE_MV* is .066, compared with .045 for *ROE_BV* and .041 for *ROE_ABV*, representing a more than 40 per cent increase in intra-industry earnings volatility when ROE is calculated on a market value basis. The implication is that with respect to financial institutions, average industry profitability is lowered and intra-industry earnings volatility is increased by the financial instruments subject to market value accounting under SFAS 119.

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[11] Moreover, the value exceeds 10 per cent (20 per cent) of book equity for 18 per cent (9 per cent) of sample firms.

TABLE 2

COMPARISON OF DIFFERENT ROE MEASURES

| | *ROE_BV*[a] | *ROE_ABV*[b] | *ROE_MV*[c] |
|---|---|---|---|
| **Panel A: Univariate results for ROE** | | | |
| Mean | 0.248 | 0.233 | 0.217 |
| Standard error | 0.021 | 0.012 | 0.025 |
| Median | 0.168 | 0.161 | 0.156 |
| Standard deviation | 0.212 | 0.201 | 0.258 |
| Sample variance | 0.045 | 0.041 | 0.066 |
| Kurtosis | 4.633 | 5.755 | 18.627 |
| Skewness | 2.134 | 2.305 | 3.392 |
| **Panel B: Correlation between measures of ROE** | | | |
| *ROE_BV* | 1 | | |
| *ROE_ABV* | 0.976 | 1 | |
| *ROE_MV* | 0.863 | 0.881 | 1 |

[a] *ROE_BV* is net income to common shareholders divided by average shareholder's equity.

[b] *ROE_ABV* is net income to common shareholders divided by average shareholder's equity plus FVBV.

[c] *ROE_MV* is calculated after adjusting net income to common shareholders for unrealized gains/losses on both available-for-sale marketable securities and other financial instruments.

### *Analysis of* $X_{fv,FI,t}$ *and* $X_{fv,MS,t}$ *Components*

The Pearson correlation between $UNREAL_{95}$ and $X_{fv,MS,96}$ is significantly greater than zero at the .05 level, consistent with the scenario in which (a) marketable securities gains are recurring and (b) a percentage of marketable securities gains remains unrealized in the period they are earned. By contrast, the Pearson correlation between $FVBV_{95}$ and $X_{fv,FI,96}$ is significantly less than zero at the .05 level. This suggests that unrealized financial instrument gains tend to reverse.

The correlation between reported earnings in 1996 and $X_{fv,MS,96}$ is significantly greater than zero at the .05 level, consistent with both (a) marketable securities gains and losses being correlated with other sources of income and (b) realized and unrealized marketable securities gains and losses being correlated with each other. By contrast, the correlation between reported earnings in 1996 and $X_{fv,FI,96}$ is insignificantly different from zero, implying either that (a) financial instrument gains and losses are unrelated to the firm's underlying operating profitability, or (b) realized and unrealized financial instrument gains and losses are uncorrelated.[12]

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[12] These correlations were calculated both on the raw variables and on the variables scaled by the ending book value of equity.

## EMPIRICAL TESTS OF THE VALUE RELEVANCE OF FAIR VALUE DISCLOSURES FOR FINANCIAL INSTRUMENTS

Based on equations (3) and (4), Models (1) and (2) are estimated to examine the value relevance of SFAS 119 disclosures. Because all sample observations are in the same industry and year (1996), no control variables are used for the cost of equity capital or the risk-free rate of return.

$$MV/BV_t = b_0 + b_1(X_{bv,t} - r(BV_{t-1}/2 + BV_t/2))/BV_t + b_2 FVBV_{t-1}/BV_t + b_3 X_{fv,FI,t}/BV_t + b_4 X_{fv,MS,t}/BV_t \qquad \text{(Model 1)}$$

$$MV/BV_t = b_0 + b_1(X_{bv,t} - r(BV_{t-1}/2 + BV_t/2))/BV_t + b_2 FVBV_t/BV_t + b_3 X_{fv,FI,t}/BV_t + b_4 X_{fv,MS,t}/BV_t \qquad \text{(Model 2)}$$

Panel A of Table 3 provides results for Models (1) and (2) using $r = .12$ to estimate residual earnings, and Panel B provides results for Model (1) using $r = .08$ to estimate residual earnings.[13] All significance levels are based on White's (1980) heteroskedastic-consistent estimates, and all variables are scaled by $BV_t$.[14] The $R$-squared for Models (1) and (2) are approximately 91 per cent, implying that the models explain most of the variation in the market value of equity (scaled by book value) within the banking industry. Comparable to that reported by Nelson (1996), the estimated intercept ($b_0$) is 1.80. The estimated coefficient for $b_1$ is 15.85, which is greater than $1/r$ (1/.12).[15]

Most important, the results show that the estimated coefficient $b_2$ is significantly *less than zero* at the .05 level in both Models (1) and (2). The rationale is that $b_2 = (1 - \alpha r)$, and $\alpha > 1/r$ (i.e., 15.85 > 1/.12). Hence, the SFAS 119 fair value disclosures are value-relevant, though not in the expected manner.

The estimated coefficient $b_4$ for $X_{fv,MS}$ is significantly greater than zero in both Models (1) and (2), implying that unrealized gains on marketable securities have positive persistence. An $F$-test shows that $b_4$ is less than $b_1$ at the .05 level, implying that the persistence of realized residual income is greater than that for unrealized security gains. The estimated coefficient $b_3$ for $X_{fv,FI}$ is significantly negative in Model (1) and insignificantly negative in Model (2).[16]

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[13] Dechow *et al.* (1999) also use a discount rate of 12 per cent.

[14] The motivation for deflation is to control for a serious heteroskedasticity problem, as there are significant cross-sectional differences in the levels of the variables and in the variance of the residuals calculated using the raw levels. In addition, there is high multi-collinearity in the undeflated variables. For example, for the subsample of low growth firms, the correlation between the parameter estimates of FVBV and BV is –.92.

[15] This is not necessarily inconsistent with the Ohlson (1995) and Feltham and Ohlson (1995) information dynamics for the time-series of residual earnings. Rather, it is possible, as argued by Dechow *et al.* (1999), that the market does not incorporate the residual earnings stream in the manner implied by the Feltham and Ohlson dynamics. For example, Dechow *et al.* (1999) conclude that the information contained in $\delta O_t$ is not priced, even though it allows for more accurate forecasts of residual earnings.

[16] Barth (1994) concludes that measurement error may be a significant factor in models examining changes in fair value-book value differences. The significant results for $b_4$ suggest that measurement error is not severe in the calculation of the change in fair value-book value differences for marketable securities.

TABLE 3

RELATION BETWEEN FINANCIAL INSTRUMENT FAIR VALUES AND SECURITY VALUES

| | Coefficients | *t* stat. |
|---|---|---|
| **Panel A: $r = .12$** | | |
| Model (1) | | |
| Intercept | 1.80 | 24.0* |
| $b_1$ | 15.85 | 15.54* |
| $b_2$ | −1.47 | −2.0** |
| $b_3$ | −2.06 | −2.05** |
| $b_4$ | 2.44 | 2.28** |
| Adjusted $R^2 = 90.9\%$ | | |
| Model (2) | | |
| Intercept | 1.80 | 25.35* |
| $b_1$ | 15.85 | 15.62* |
| $b_2$ | −1.47 | −2.0** |
| $b_3$ | −0.59 | −0.69 |
| $b_4$ | 2.44 | 2.28** |
| Adjusted $R^2 = 90.9\%$ | | |
| **Panel B: $r = .08$** | | |
| Model (1) | | |
| Intercept | 1.19 | 12.53* |
| $b_1$ | 15.80 | 15.42* |
| $b_2$ | −1.44 | −1.94*** |
| $b_3$ | −1.94 | −1.92*** |
| $b_4$ | 2.44 | 2.18** |
| Adjusted $R^2 = 90.8\%$ | | |

With respect to the choice of the $r$ used to compute residual returns, a comparison of the results for Model (1) presented in Panels A and B shows that the only difference between using $r = .08$ and $r = .12$ is that the estimated intercept is considerably lower (1.19 vs 1.8) with $r = .08$.[17]

As previously argued (I1), the estimated coefficient for FVBV ($b_2$) is negatively related to the growth in residual-income. To further investigate the relation between growth rates and the estimated coefficient $b_2$, Models (1) and (2) are estimated

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[17] The intuition of this result is that the intercept term, which is the coefficient on book value of equity, reflects the value of the firm's 'normal earnings'. The higher the discount rate, the greater the value of the assets' 'normal earnings'.

TABLE 4

RESULTS FOR MODEL (1) PARTITIONED ON EARNINGS GROWTH ($r = .12$)

| | Coefficients | *t* stat. |
|---|---|---|
| **Panel A: High-growth firms** | | |
| Intercept | 1.44 | 8.47* |
| $b_1$ | 16.84 | 14.06* |
| $b_2$ | −1.80 | −1.91*** |
| $b_3$ | −1.52 | −1.09 |
| $b_4$ | 1.88 | 1.59 |
| Adjusted $R^2 = 89.0\%$ | | |
| **Panel B: Low-growth firms** | | |
| Intercept | 1.89 | 29.08* |
| $b_1$ | 8.96 | 5.44* |
| $b_2$ | −0.14 | −0.20 |
| $b_3$ | −1.30 | −1.50 |
| $b_4$ | 0.47 | 0.24 |
| Adjusted $R^2 = 41.8\%$ | | |

separately for firms with sustainable growth in book value above and below the sample median (.102).[18] Results are provided in Table 4.

Results in Table 4 show that, as one would expect, the multiple on residual-income ($b_1$) is considerably greater (16.84 vs 8.96) for the high-growth subsample (Panel A) than for the low-growth subsample (Panel B). More important, the estimated coefficient $b_2$ is significantly negative for the high-growth subsample, it is insignificantly different from zero for the low-growth subsample, and the estimated coefficient $b_2$ is significantly lower (at the .05 level) in the high-growth subsample than in the low-growth subsample.[19] These results imply that in 1996, evidence of the value relevance of financial instrument disclosures is only provided by the high growth subsample. However, in other years, if market expectations were pessimistic concerning future profitability, $\alpha$ may be less than $1/r$ and $b_2 = 1 - \alpha r$ may be significantly greater than zero for low-growth firms but not for high-growth firms. In summary, one cannot use an insignificant result for $b_2$ in Models (1) and (2) to support the conclusion that financial instrument are not value relevant for a subset of firms or time-periods.

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[18] Sustainable growth in book value is defined as earnings minus common and preferred dividends, divided by the ending book value of equity. The sustainable growth in book value is a reasonable proxy for the rate at which residual-income can grow.

[19] The latter was tested by estimating Model (1) after inserting an additional independent variable: *FVBV_BEG*GROWTH*, where *GROWTH* is a zero-one dummy variable with a value of one if the firm's earning growth exceeds the sample median. The estimated coefficient for the *FVBV_BEG*GROWTH* variable was significantly less than zero at the .05 level.

Several of the other coefficient predictions based on equations (3) and (4) are also tested. As predicted (I3), an $F$-test shows that the estimated coefficient $b_3$ is significantly lower than that for $b_4$, at the .05 level, in both Models (1) and (2). It can be derived from equation (4) that the coefficient for FVBV ($b_2$) plus two times the coefficient for $X_{fv,FI}$ ($b_3$) $= 2\gamma + 1$, or $(b_2 + 2b_3) = 2\gamma + 1$. Therefore, if $\gamma = 0$, then one would expect that $(b_2 + 2b_3 - 1)/2 = 0$ (I4). The implied value for $\gamma$ is approximately –.83, but the $F$-test of whether $(b_2 + 2b_3 - 1)/2 = \gamma$ differs from zero is not significant at the .05 level. The implication is that while the estimated coefficient for $X_{fv,FI}$ is significantly less than zero, there is no evidence that $\gamma$ is significantly different from zero. Likewise, according to equation (4), since the theoretical value for $b_4$ is $\omega$, a test of whether $\gamma = \omega$ can be conducted by testing whether $(b_2 + 2b_3 - 1)/2 = b_4$. The $F$-statistic for this test is significantly different from zero, at the .05 level, implying that $\omega$ is significantly greater than $\gamma$. While the estimated $b_2$ coefficient is identical in Models (1) and (2), as predicted by equations (3) and (4) (I2), no formal test is conducted.

The results for Models (1) and (2) are robust to a number of alternative specifications. For example, results are substantially unchanged if $X_t^a = r(BV_{t-1})$ or if $X_t^a = r(BV_t)$, although the algebra changes slightly. Likewise, results are substantially unchanged if the level of nonperforming loans (scaled by equity) is added as an independent variable. This suggests that the omission in Models (1) and (2) of proxies for $\delta O$ in the Feltham and Ohlson model does not bias the estimated coefficients. Multicolliniarity does not appear to be an issue in Models (1) and (2), as the variance inflation statistics do not exceed 1.2 for any of the independent variables. Model specification appears to be adequate, as the White test for model specification and heteroskedasticity is insignificant.[20]

## SUMMARY AND CONCLUSIONS

This article analyses the value relevance of SFAS 119 fair value disclosures in the context of a residual-income valuation model. The main conclusion is that with a residual-income valuation model, the estimated coefficient for the relation between fair value-book value differences and equity-market values is an inverse function of the valuation multiple for residual earnings. As a result, the estimated coefficient on the fair value-book value difference variable may be insignificant or negative, even if the fair value-book value differences increase the firm's market value of equity. The basic intuition is that while a positive fair value-book value differences results in increased future earnings, it also generates a greater charge to residual-income for the cost-of-equity-capital than that implied by the firm's book value.

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[20] The models were also estimated after adding $1/BV$ as an additional independent variable, which corresponds to the addition of an intercept term in Model (2). While there were some minor differences in results, the basic result obtained here still holds. Specifically, the difference in the estimated values of the FVBV coefficient for the high growth and low growth firms was still significant at the .05 level.

More generally, when using a residual-income valuation model, unrealized gains and losses on items that are reported in the balance sheet at market value (e.g., the translation adjustment on foreign subsidiaries and available-for-sale marketable securities) will be related to market values in different ways than unrealized gains and losses on items that are not reported in the balance sheet at market value (e.g., financial instruments).[21] For example, if the firm has an overfunded pension plan that is not captured on the balance sheet, the value of the firm's net assets is greater than their book value but the firm's cost-of-equity-capital charge to residual income is also greater than that based on book value. Hence, when using a residual-income valuation model to link equity values and overfunded pension plans not reflected on the balance sheet, the estimated coefficient on unrecognized pension assets will not necessarily be positive, even if the overfunded pension plans actually increase equity values. The reason is that the estimate may suffer from the same methodological issue as illustrated here for the estimated coefficient for the relation between financial instrument values and equity market values.

An implication for accounting policy makers in countries that do not yet require financial instrument disclosures is that it may be difficult to interpret evidence either for or against increased disclosures of financial instrument fair values, because results may be highly sensitive to the type of valuation model used in the research design. Specifically, in the context of a residual-income valuation model, insignificant or even negative coefficient estimates for the variable representing fair value-book value differences for financial instruments should not result in the rejection of the hypothesis that fair value-book value differences for instruments are positively related to the market value of equity.

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[21] Likewise, one should not combine unrealized gains/losses that are recognized on the balance sheet with those that are not recognized, and then estimate one parameter linking the sum of those unrealized gains/losses to equity values.

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# An Analysis of the International Development of the Equity Method

The equity method was used as an early form of consolidation for all subsidiaries in the U.K. and for certain subsidiaries in the U.S. Another use of the method in some countries, even in the era of full consolidation, has been in the financial statements of investor legal entities. This seems to result from using the equity method as a technique for valuation or as an aid in the preparation of consolidated statements rather than as a form of consolidation. The method has also been used as a substitute for consolidation for excluded subsidiaries or for controlled companies not included in the definition of subsidiaries. Later, the equity method was introduced for joint ventures and then for other forms of 'strategic alliance', but the latter bring definitional problems, which have led to a consensus around an arbitrary threshold of 20 per cent of voting rights. This article traces these developments across time and space, and criticizes several of the past and present applications of the equity method. There is also an examination of the development of the terms 'equity method' and 'associated company'.

**Key words:** Accounting; Equity; International.

Across time and across countries, the equity method has been used for different types of investees, and it has also been used in both unconsolidated and consolidated statements. The present international consensus about its use in consolidated statements for certain non-subsidiary investees is hard to defend on the basis of extant accounting conceptual frameworks or of legal concepts. The consensus about the threshold (20 per cent shareholding) connected to the use of the equity method seems to have arisen by accident. The spread of the equity method is another example of the international transfer of accounting technology, as

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outlined by Parker (1989) for double-entry bookkeeping and for the true and fair view requirement (see also Nobes, 1993, for the spread of the latter in Europe).

There are several forms of the equity method (e.g., see Ma *et al.*, 1991, p. 188), but the common feature is the inclusion in the investor's income statement of the appropriate proportion of the investee's earnings rather than merely the dividends flowing to the investor or, at the other extreme, rather than the investee's detailed revenues and expenses. In the investor's balance sheet, there is also 'one-line consolidation' of the net assets of the investee rather than merely the cost of the investment and rather than line-by-line consolidation of assets and liabilities. As will be clear to users of American English, the term 'equity method' implies a measurement at the investor's proportion of equity (subject in some versions to adjustment for goodwill), which is equal to net assets. This article does not deal with the technical details of the equity method except when there are underlying theoretical issues of relevance to the paper's theme.

To begin, there is a description of the use of the equity method early in the twentieth century as a form of consolidation used before full consolidation had developed (called 'proto-consolidation', below). Its use in parent company statements (pseudo-consolidation) is also a long established treatment of subsidiaries. Another early use was in consolidated statements for excluded subsidiaries (substitute-consolidation). The next three sections below deal with these uses relating to subsidiaries.

In the 1960s, the equity method began to be recommended also for investments in certain non-subsidiaries: as a form of pseudo-consolidation in investor statements and as a form of semi-consolidation in consolidated statements. It is possible to see pseudo-consolidation and semi-consolidation as techniques of valuation rather than of consolidation. For all these uses, there has been opposition, concentrated in a few countries.

This article pieces together the above history, analyses the reasons for the rise of the equity method and assesses the strength of the criticisms. The threshold for the use of the equity method is also examined. One conclusion is that the forces of accounting harmonization might have overcome logic and law, and that the equity method is inappropriate for most, if not all, of its present uses; a point noted earlier by, for example, Chambers (1974) and Miller and Leo (1997). There is also a summary of previous academic research and a look at the development of the terms used in the context of the equity method in various countries.

Thus, the aim is to contribute to the literature on the international transfer of accounting technology, but there are also major policy implications for standard setting in an area of financial reporting where further developments can be expected soon (Milburn and Chant, 1999). The concentration is on major countries in the English-speaking world and Continental Europe. In the topic areas considered here, the rest of the world has probably derived its practices from these countries. For example, for Japan, there are many consolidation practices similar to those of the U.S.A., including the 20 per cent threshold for equity accounting (Sawa, 1998). Issues of special relevance to group structures in the Far East (e.g., the Keiretsu in Japan or the Chaebol in Korea) are not examined here.

## PROTO-CONSOLIDATION

In the U.K., the earliest use of the equity method appears to be for the purposes of including subsidiaries in the financial statements of investors as an alternative to consolidation. This method was more common than full consolidation in the 1910s and was still used in the 1920s (Edwards and Webb, 1984, Table 1); for example by Lever Brothers (Edwards, 1989, p. 229). On the whole, the equity method was superseded, in the 1930s, by full consolidation or no consolidation; predominantly the latter (Bircher, 1988, p. 7). Another approach was to treat subsidiaries as though they were branches of the parent. This was still practised in the 1930s in such companies as Unilever (Hodgkins, 1979, p. 45). Only with the Companies Act 1947 did 'branching' finally disappear.

Walker (1978a, pp. 99, 117) suggests that the equity method became less popular because, in the context of the conservative mood following the Royal Mail case, it was interpreted as recognizing unrealized profit. However, Edwards and Webb (1984, p. 40) point out that the equity method is more conservative in the sense that it does not ignore losses of subsidiaries as the cost-based method can. As another part of the explanation, they note that the Greene Committee on law reform and the Companies Act 1928 provided no support for the equity method. The Act required holding companies to show shares in subsidiaries, which would not be shown naturally by the equity method. Counsel's opinion[1] suggested that the balance sheet of the legal entity should be the one filed and presented to the shareholders.

In the U.S., a more full-blooded approach to consolidation was taken at the beginning of the century, without much need for partial steps such as the equity method. This seems to be due to fewer legal problems in the U.S., less conservatism of practice, and to acceptance of consolidation for certain purposes by the tax authorities and the New York Stock Exchange (Edwards and Webb, 1984, pp. 41–7; Walker, 1978a, Section III). Nevertheless, the equity method was used in parent company statements for certain subsidiaries. For example, Kester (1918, p. 261) distinguished between parents which had 'substantially full ownership' of subsidiary companies and cases where 'ownership is not complete but still controlling'. For the latter, the equity method in parent statements was seen as a reasonable alternative to the preparation of consolidated statements.

## PSEUDO-CONSOLIDATION

The early use of the equity method for subsidiaries in the financial statements of holding companies before the full development of consolidation is considered above under 'proto-consolidation'. However, its use has continued in parent statements in some jurisdictions despite inclusion of the subsidiaries in consolidated statements. In the U.S., a long line of textbooks describe and recommend the use of the equity method in this context. Until the 1960s, there was little promulgated GAAP[2] in this area, so textbooks and monographs contributed to unpromulgated GAAP.

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[1] Edwards and Webb (1984) refer to *The Accountant*, 31 August 1929, p. 281.

As noted above, Kester (1918) recommended use of the equity method in parent statements early on for certain purposes, but was still recommending it in his 1933 edition and the 1945 reprint of that (pp. 194–5), when consolidated statements had become fully developed. Perhaps because of the comparative lack of legal restraints, Kester (1918, p. 262) had no qualms about the resulting profit, suggesting that 'the profit taken onto the books of the holding company by the above method is a real, not a book, profit', given that the parent controls the subsidiary's dividend policy. A similar view was taken by Finney (1922, p. 42) for the investment account in the holding company's books, even though there would also be a consolidated balance sheet.

Moonitz (1944, p. 49) also advocated the use of the equity method in the parent's books for several reasons:

1. The cost method makes sense when there is uncertainty but that does not apply to subsidiaries (p. 48) over which there is full control of dividend policy (p. 49).
2. The status of the investments varies with the fortunes of the investees not with the movements of cash (p. 49). Income accrues as the investments increase in value. Income accrues to the parent when it accrues to the subsidiary (p. 52).
3. The validity of the subsidiary's profit calculation is as well established as the parent's (p. 49).
4. Because companies plough back part of their profits, the cost rule will probably understate parent income in prosperous periods (p. 53).

Incidentally, Carman (1932, p. 103) and Dickerson and Weldon Jones (1933, p. 200) also propose the method for the treatment of subsidiaries in the investment account of the parent. However, they see it as a useful arithmetic device for preparing consolidated balance sheets when there are several layers of subsidiaries. They seem to regard the resulting balance sheet of the parent as not important in its own right, so that they should not be seen as proposers of pseudo-consolidation.

The contrary point of view to that of Kester and Moonitz is argued by Kohler (1938) who suggests that 'no practical benefits are derived from accruing profit and loss of subsidiaries on the books of the controlling company'. This is strongly supported by Paton (1951), who specifically opposes Moonitz' arguments: 'He is recommending, in effect, that the parent company keep its own accounts from the consolidated point of view, and were his recommendation adopted there would be little excuse left for preparing consolidated statements' (p. 46).

Despite this disagreement, it is clear that the method was acceptable where it really mattered. Kester (1945, pp. 211–12) wrote that: 'The Securities and Exchange Commission considers the equity of a holding company in subsidiary profits and losses sufficiently important to require disclosure ... if such equities are not taken up on the books of the holding company'.

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[2] That is, 'generally accepted accounting principles' as adopted by a body approved by the SEC (e.g., currently, the Financial Accounting Standards Board).

Finney (1946) illustrates the use of the equity method and calls it the 'economic basis' of parent company accounting, but notes that it does not conform 'strictly to the legal realities' (p. 299). As a compromise, Finney recommends the equity method with the undistributable earnings shown separately in shareholders' equity (p. 301). The matter of whether equity-accounted profit was distributable seems not to have constrained the debate.[3]

When GAAP was promulgated in 1971 by APB Opinion 18 (para. 14), the equity method was required in parent statements. Although the requirement was subsequently removed by SFAS 94 (of 1987, para. 15), there is no replacement instruction, so the equity method can still be used in parent statements. The lack of U.S. interest in this area is because parent statements are not generally required to be filed. This is unlike the position in most countries, where the law deals with parent statements, sometimes clearly as less important than consolidated statements (as in the U.K.) and sometimes as more important (as traditionally in some other European countries).

There was no equivalent U.K. discussion, let alone advocacy, of the equity method for use in parent statements in the days before accounting standards, presumably for the legal reasons noted earlier. For example, Cropper's *Accounting* (Cropper *et al.*, 1932, p. 316) recommends that subsidiaries should be accounted for either at cost with attached statements or by consolidation. Similar recommendations come from Garnsey (1923 and 1931, ch. VI); and others are silent on the issue (e.g., Pixley, 1910; Dicksee, 1927; Dicksee and Montmorency, 1932; Bogie, 1949, 1959; Castle and Grant, 1970). Subsequently, the method was prohibited in the U.K. by accounting standard.[4] It is also not allowed for this purpose in Australia[5] (AASB 1016).

However, in the Netherlands, subsidiaries (and joint ventures and associates; see later) are reported by using the equity method in the unconsolidated financial statements of the investor (Art. 389 (1–3) Book 2, Title 9 of the Civil Code; Dijksma and Hoogendoorn, 1993, p. 132). This use of the equity method in parent statements is long-standing practice. For example, it can be found in the parent statements which accompanied one of the earliest examples of Dutch consolidation: that by Philips[6] in 1931. The treatment generally enables the equity of the parent to be equal to that of the group. The equity-accounted share of profit (in excess of dividends) is, under certain conditions,[7] shown as undistributable reserves (Art. 389 (4)). In order to allow such practices, an option was written into the EC Fourth Directive (Article 59, as amended by Article 45 of the Seventh Directive). Consequently, the Netherlands and some other member states have enacted legal permission for this practice. For example, it is allowed and common in Denmark (Christiansen and Elling, 1993, p. 136), where the practice began in the 1970s (before the Directive). It is also allowed in France (Art. L340–4, Law of 3.1.1985) and in Italy (Civil Code, Art. 2426(4)), but is seldom used. Such permission is not granted in law in the U.K. or in Germany, where equity accounting is restricted to consolidated statements. Given this international difference, it is not surprising that IAS 3 deliberately excluded this issue (para. 3), and that its replacement (IAS 27) allows, but does not require, equity accounting for subsidiaries in an investor's financial statements (para. 29).

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[3] The notion of distributable profit was discussed early on (e.g., Hatfield, 1918, pp. 205–31) but the rules vary from state to state (e.g., Littleton, 1934, pp. 140–8).

[4] SSAP 1, para. 18; FRS 9, para. 26.

[5] Except where there are no consolidated statements.

[6] I am grateful, for this information, to Professor H. L. Brink, a former Philips executive. He writes, on 20 March 1999 to Peter van der Zanden, that 'The equity per the company only and the consolidated balance sheets was exactly the same' (translation by Peter van der Zanden).

[7] The elements for which the parent cannot control the distribution of profits.

This use of the equity method in investor financial statements could be seen as an example of attempts by accountants to express commercial substance over legal form. Since an investor could usually obtain its share of profits in a subsidiary merely by requesting them, to recognize only dividends might seem like a legal nicety. A clue to another rationale for the use of equity accounting in investor statements can be found in the Dutch term for the method: *intrinsieke waarde* (intrinsic value). That is, this may be seen as a method of valuation rather than as a method of consolidation. Further, the consolidated statements are treated in Dutch law (Art. 406) as a note to the legal entity's statements, which raises an expectation of consistency of valuation, which is also encouraged by the Seventh Directive (Art. 292 (a)). These rationales are examined later.

## SUBSTITUTE-CONSOLIDATION

Another use of the equity method, this time in consolidated statements, was as a back-up in cases where certain subsidiaries were not consolidated. For example, in the U.S., Accounting Principles Board Opinion No. 18 (of 1971) required the equity method for unconsolidated subsidiaries. The reasons for lack of consolidation in the rules of the 1950s onwards (Accounting Research Bulletin No. 51, para. 2; Accounting Research Bulletin No. 43, ch. 12, para. 8) include temporary control, control being with non-majority owners, large minority interest and foreign subsidiaries (particularly those subject to restrictions on the transfer of funds).

However, the AICPA proposed that, in those cases where there was lack of control or there were foreign exchange restrictions, the cost method would be more suitable (AISG, 1973, para. 50). More recently, SFAS 94 (of 1987) requires all subsidiaries to be included except when control is temporary or when significant doubt exists about ability to control. SFAS 94 removes the APB 18 requirement to use equity accounting for unconsolidated subsidiaries, although such treatment seems still to be allowed (Williams, 1996, p. 6.05).

One important piece of context is that the U.S. definition of a subsidiary seems to be based in practice on ownership of a majority of voting shares rather than on *de facto* control. Although ARB 51 refers to 'controlling financial interest', the usual condition for this is said to be a majority voting interest, and no other examples are given (paras 1 and 2). This is reinforced by the title of SFAS 94,

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*Consolidation of All Majority Owned Subsidiaries*. As a result, certain[8] controlled investees are not seen as entities to be consolidated. Here, the equity method seems a useful fallback position.

In Australia, the matter of equity accounting was first officially raised by the accountancy bodies in 1970 in the context of the de-consolidation of loss-making subsidiaries (Zeff, 1973, p. 39; Walker, 1978b, p. 107; Gordon and Morris, 1996, p. 161). The equity method is not now used as a substitute for consolidation, because no exclusions from consolidation are allowed[9] (AASB 1024). Its use for other purposes in Australia is examined later.

The original International Accounting Standard in this area (IAS 3 of 1976) derives from a study by the Accountants' International Study Group (1973) which noted (para. 47) the use of the equity method for excluded subsidiaries. The IASC's E3 (of 1974) had proposed (para. 31) to require the method for exclusions on the ground of temporary control, but IAS 3 required its use instead as a substitute for consolidation where dissimilar subsidiaries were optionally not consolidated (para. 40). The current standard (IAS 27) no longer allows dissimilar subsidiaries to be unconsolidated. However, it does continue to require (para. 13) exclusion from consolidation when (and only when) control is temporary (and the investee has never been consolidated) or when there are severe long-term restrictions on the transfer of funds to the parent. In such cases, reference should be made to IAS 25 on investments (or from 2001 to IAS 39), which does not allow the equity method. Perhaps this is reasonable, as there is no long-term significant influence.

In the U.K., SSAP 14 (of 1978) contained the earliest requirement for the use of the equity method for subsidiaries excluded from consolidation for reasons of dissimilarity or lack of effective control (paras 23 and 24). Subsequent law[10] confirmed this. Thus, the equity method acted as a safety net for the partial inclusion of companies that were controlled but were 'off balance sheet' due to the lax U.K. definition[11] of a subsidiary in the U.K. until the Companies Act 1989. The requirement is retained by FRS 2 (of 1992) for subsidiaries excluded on the grounds of dissimilarity (para. 30), although such cases are said to be exceptional (para. 25(c)). Support for this exclusion and for the concomittant use of the equity method seems to come from the EC Seventh Directive.[12] Consequently, it can be found in the laws of other member states (e.g., Germany: *HGB*, §295 (1)[13]; Italy: *Decreto Legislativo 127*, Art. 36; Sweden: Annual Accounts Act 1995, Chapter 7, Section 23).

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[8] The SEC has a somewhat broader notion, including special purpose entities. EITF 90–15 also goes somewhat further.

[9] 'Temporary' exclusions are not allowed; the existence of severe restrictions on ability to control implies that the investee is not a subsidiary.

[10] Companies Act 1981; re-enacted as Sch. 4, para. 65(1) to the 1985 Act; then, in 1989, relating to dissimilarity, as Sch. 4.A, para. 18.

[11] The definition was expressed (Companies Act 1985, s. 736) in terms of control of the composition of the board (not votes on the board), or ownership of the majority of equity (not of voting equity). This gave rise to the possibility of 'controlled non-subsidiaries'.

[12] Reference in Article 14 (1) (on exclusion) is made to Article 33 (on the equity method).

## SEMI-CONSOLIDATION

So far, there has been concentration on three types of use of the equity method for the treatment of subsidiaries, as summarized in the first column of Table 1. Another use of the equity method is in consolidated statements (and sometimes in investor statements) for certain investees other than subsidiaries. Here the rationale for the equity method as a form of semi-consolidation or of valuation is less clear than above, as will be explored in a later section, after a discussion of some definitional points and an outline of international practice.

### *Scope*

The major issue here is to identify the nature of the non-subsidiary investees for which equity accounting would be a suitable treatment. It is clear that, in the U.K. and the U.S., joint ventures were originally much in mind. The first exposure draft (in 1970) of the U.K.'s Accounting Standards Steering Committee (ASSC)[14] was on the subject of equity accounting, for reasons explored below. It defined an associated company as a joint venture or a company in which there is a substantial interest '(i.e. not less than approximately 20 per cent of the equity voting rights)' (para. 6).

TABLE 1

USES OF EQUITY METHOD

| | Subsidiaries | Joint ventures | Associates |
|---|---|---|---|
| Investor statements | I *Proto-consolidation* (e.g., U.K. and U.S., early 20th century)<br>II *Pseudo-consolidation* (e.g., Netherlands) | III *Pseudo-consolidation* (e.g., Netherlands) | IV *Pseudo-consolidation* (e.g., Netherlands) |
| Consolidated statements | V *Substitute consolidation* (e.g., U.S. if no majority votes; formerly for foreign subsidiaries and dissimilar subsidiaries) | VI *Semi-consolidation* (e.g., U.S.; and EU Directive and IAS 31 when not using proportional consolidation) (Note the use of gross equity method in U.K.) | VII *Semi-consolidation* (e.g., U.S. and EU) (Note former Australian use of disclosures based on equity method for this Case and Case VI) |

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[13] Ordelheide and Pfaff (1994, p. 177) suggest that it is also appropriate for optionally excluded subsidiaries (e.g., limitations on control).

[14] Established in 1970 and later re-named the Accounting Standards Committee.

Commenting on the development of the U.K. standard, Leach (1981, p. 6) states that 'the existence of consortium companies, controlled by no single corporate body, was very much in point' and that the definition 'emerged as the concept of partnership, recognition of substantial interest... and ability to exercise substantial influence'.

The U.S. statement of 1971 on the equity method referred to 'joint ventures and certain other investments in common stock' (APB Opinion 18, para. 1). Thus, there are two categories in the original U.K. and U.S. statements, but joint ventures come first, and the others are to be treated in the same way.

In some other jurisdictions (e.g., Australia, France and now in the U.K.), a clear separation of joint ventures from associates is made. It leads to the possibility or the requirement that joint ventures and associates are treated differently. The rest of this section considers the use of the equity method for associates in consolidated and investor statements. In the following two sections, more detail is added to the above outline of the definition of an associate, and the special treatments for joint ventures are considered.

### *Recommendations and Requirements for Consolidated Statements*

This subsection looks at the treatment of associates in consolidated financial statements. It is followed by a note on treatments in investor statements. The requirement to use the equity method for associates (defined then as including joint ventures) in consolidated statements can be found in the U.K.'s SSAP 1 (of January 1971). This followed 'extensive developments' in the 1960s of holdings in associates (Shaw, 1973, p. 176) and a brief period of experimentation with the method by some British companies (Accountancy, 1970b). Tweedie (1981, p. 171) reports that the ASSC stated that only nine out of a survey of 300 major companies for 1968[15] went beyond accounting for dividends received. However, this had risen to twenty for 1969 (ICAEW, 1971); and it included some very important companies (e.g., GEC and Dunlop). Incidentally, Tweedie suggests that the equity method was therefore 'not a subject of great controversy' (p. 171) and that it was chosen as the ASSC's first topic partly because the ASSC had inherited work-in-progress for a draft Recommendation from the Institute of Chartered Accountants in England and Wales. By contrast, the first chairman of the ASSC suggested that the topic was 'a highly controversial one', chosen because of varied practice (Leach, 1981, p. 6). The controversial aspect is backed up by an editorial in *The Accountant* (1970) and, in retrospect, by Sharp (1971). Perhaps these views are reconcilable by noting that the subject was not controversial *before* ED 1 but that the ASSC's proposal *caused* a controversy.

Of relevance here are several observations by Napier (1999). There are at least two reasons why the ASSC's first chairman (Sir Ronald Leach) would have been interested in this topic. First, Leach was one of the inspectors appointed by the government in September 1969 to investigate Pergamon Press which had not shown its share of a large 1968 trading loss in its consolidated profit and loss account because it was not using equity accounting for its 50 per cent interest in a company (Napier, 1999, pp. 6, 12, 14, 17). Second, Leach's most important audit client, Rank Organisation, had a 49 per cent interest in a company that carried out the group's most important operations, Rank Xerox.

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[15] Tweedie and the survey's title refer to 1968–9, but that is largely to include a few companies with year ends in early January 1969.

Similar U.S. requirements on equity accounting date from very slightly later: APB Opinion 18 of March 1971. In some other countries, recommendations can be found in the 1960s. In France, a ministerial decree of 20 March 1968 (Beeny, 1976, p. 147) referred to methods used in group accounts, including full consolidation (*intégration globale*), proportional consolidation (*intégration proportionnelle*) and equity accounting (*mise en équivalence*). The equity method was recommended for companies in which the investee held more than 33.3 per cent of the equity and which were neither subsidiaries nor joint ventures. There was further official encouragement from the Conseil National de la Comptabilité (CNC, 1973).

In the Netherlands, the non-governmental[16] Hamburger Report of 1962 recommended a version of the equity method ('intrinsic value', see above) for 'participations' (*deelnemingen*), which are long-term significant holdings where the business of the investor and investee are similar (Zeff *et al.*, 1992, p. 135). This would include joint ventures. The governmental Verdam Commission reported in 1964, recommending particular disclosures (although no particular accounting method) for such investments, defined as holdings of 25 per cent or more (Zeff *et al.*, 1992, p. 154). The first exposure draft of the Tripartiete Overleg[17] in 1971, following soon after U.K. and U.S. drafts, also preferred a version of the equity method for participations (Zeff *et al.*, 1992, p. 207).

This growing international consensus led to the inclusion, in the IASC's E3 (of 1974) and IAS 3 (of 1976) and in the EC Seventh Directive (drafts of 1976 and 1978, and Article 33 of the final version of 1983), of requirements for the use of equity accounting for associates in consolidated statements. The requirement in the Directive also explicitly covers joint ventures unless proportionally consolidated (see later). Some European countries had held out against the equity method until they were overwhelmed by the Seventh Directive. For example, in Germany, the concept of the group in the 1965 *Aktiengesetz* was based on uniform direction (*einheitliche Leitung*), which survives as an optional basis for the definition of a subsidiary in the Seventh Directive (Art. 1 (2)). On this conceptual basis, since associates are not managed on a unified basis with the investor (because they are not controlled) and so they are not group companies, they had to be accounted for on a cost basis. Although German influence was clear on many issues in the first draft of the Seventh Directive, the Germans had little support on this point and the equity method for associates was proposed as compulsory from the beginning (Diggle and Nobes, 1994, p. 324).

[16] Set up by the Council of Dutch Employers' Federations.

[17] Tri-partite committee; the predecessor of the Council for Annual Reporting (Raad voor de Jaarverslaggeving).

In Sweden, the equity method was regarded with suspicion from a legal standpoint in the early 1980s. The doubt concerned whether the equity method was a legally acceptable valuation method.[18] A few large groups used it in consolidated statements but most did not (Cooke, 1988, p. 62). Legal doubts were partially resolved by considering the equity method as a form of consolidated rather than as a valuation method. The equity method was proposed for consolidated statements by the then standard-setting body (FAR) in 1986 (Heurlin and Peterssohn, 1995, p. 1997) before becoming legally required on implementation of the Seventh Directive in the Swedish Annual Accounts Act of 1995 (Chapter 7, Article 24).

Outside of Europe, the most sceptical country has been Australia. A series of exposure drafts (1971, 1973 and 1979) recommending equity accounting began to be issued soon after those in the U.K. and the U.S. However, these met problems. First there was an impediment arising from a legal interpretation of the Victorian Companies Act 1971 that group accounts should encompass only the holding company and subsidiaries and therefore not equity-accounted earnings. Gordon and Morris (1996, p. 166) explain how the legal debate began in 1972 and continued for years. The legal impediment is also discussed by Eddey (1995, p. 303) and Vallely *et al.* (1997, p. 17). There were also, in the 1980s, abuses of the equity method. For example, some effectively controlled entities were equity-accounted instead of being consolidated, and some investees not subject to significant influence were equity-accounted (Ma *et al.*, 1991, pp. 204–8). Consequently, the standard setters eventually limited the use of the equity method to disclosures based on it (Ma *et al.*, 1991, p. 191). Some Australian groups showed an extra column in their consolidated financial statements on an equity-accounted basis (Deegan *et al.*, 1994).

Just as the legal and conceptual doubts of Germany and Sweden seem to have been swept aside by majority international practice rather than by clear arguments, even Australia amended AASB 1016 in 1998 to require equity accounting, following the removal of the legal impediment and a commitment to harmonization with IASC standards (Peirson and McBride, 1997). To avoid a conflict with the Australian conceptual framework (which clearly places associates outside the group reporting entity) and the consolidation standard, equity accounting is said to be a valuation method rather than a consolidation technique (Miller and Leo, 1997). This is up-side down compared to the reasoning in Sweden (noted above), although it fits the Dutch view.

### *Associates in Investor Statements*

In most countries examined here, associates (like subsidiaries) are valued at cost in investor financial statements. However, in those countries where pseudo-consolidation (or valuation) is used for subsidiaries in an investor's statements, it is generally extended to associates and joint ventures. Otherwise, the objective of making the group equity equal to the investor's equity is not achieved.

For example, in Denmark and the Netherlands, the equity method is used in the investor's statements for associates and joint ventures. This appeared to be in conformity with the Fourth Directive, where Article 59 allowed such treatment for an undefined category of 'affiliated undertakings'; and this was clarified by an amendment in Article 45 of the Seventh Directive which refers to significantly influenced undertakings. In the U.S., the equity method was also originally required in parent statements for those investments that were equity accounted in consolidated statements (APB Opinion 18, para. 17). It is presumably now allowed despite the amendments to SFAS 94 (see the earlier section on pseudo-consolidation). It is also allowed by IAS 28 (paragraph 12). In the same way as for subsidiaries, the method is allowed for associates in France and Italy (but not used), and is not allowed in the U.K. or Germany.

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[18] I am grateful, here, to Rolf Rundfelt of KPMG, Sweden.

## MORE ON THE DEFINITION OF AN ASSOCIATE

### *The UK Origins of the 20 Per Cent Threshold*

U.K. and U.S. rules (SSAP 1 and APB Opinion 18, both of 1971) basically defined associates[19] as those over which the investor exercises a significant influence over operating and financial policies (SSAP 1, para. 13; APB Opinion 18, para. 17). This is the definition followed by the EC Seventh Directive of 1983 (Article 33 (1)), and therefore found in many European national laws.

However, this is a much vaguer concept (and more difficult to audit) than even the concept of 'control' which is the basis of the definition of a subsidiary in many jurisdictions. Consequently, it is difficult to operationalize (Chambers, 1974) and guidance is needed if standardized practice is to result. Part of the guidance comes in the form of a numerical threshold of the percentage of shares (or voting shares) to be held. In some jurisdictions, the threshold appears to be of a mechanical nature; in others it is hedged around with rebuttable presumptions. This point will be considered after the *size* of the threshold has been examined. The emergence of an internationally agreed threshold of 20 per cent of voting shares seems to have been accidental, as will now be charted.

There is a long history of separately identifying non-subsidiary investments above a certain size of holding. For example, in the U.K., the Companies Act 1947[20] designated certain holdings as 'trade investments'. According to Shaw (1973, p. 175), these: 'may be taken to be investments made to cement a trading relationship or for specific purposes associated with the trade of the investing company'.

Recommendation N 20 (ICAEW, 1958, para. 41) also required disclosures relating to material, but undefined, 'associated companies'. The Companies Act 1967 (s. 4) was more precise and required some non-financial disclosures where an individual investor held more than 10 per cent of equity[21] in an investee. Also, the London Stock Exchange Listing Agreement required, at least from the first 'Yellow Book' of 1966, disclosures about so called 'associated companies', defined originally as those in which the investing group held more than a certain threshold level of equity. Shaw (1973, p. 176) suggests that this was a significant precedent for the ASSC's work because of the use of the term 'associated company' and the reference to total group holdings rather than to investor holdings. These two points distinguish the Stock Exchange's requirement from previous company law or tax law. Shaw (1973, p. 176) also states that the Listing Agreement uses a 20 per cent threshold, which would seem to clinch the argument about the source of the definition. However, the Yellow Books of June 1966 and of April 1969 use 25 per cent in their definitions.[22] This threshold is noted in the ICAEW's survey of 1970–71 (ICAEW, 1972, p. 13). An amendment to the Yellow Book, to reduce the threshold from 25 per cent to 20 per cent holdings, was published in June 1972, which puts it *after* SSAP 1, suggesting that the latter influenced the stock exchange, rather than the other way round.

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[19] APB Opinion 18 does not use this term, although it can be found in U.S. literature (e.g., Neuhausen, 1982, p. 55).

[20] Consolidated as paras 8(1)(a) and 12(1)(g) of Schedule 8 to the 1948 Act.

[21] Or where the book value of the shares was more than 10 per cent of total assets.

In the U.K., the ASSC's first exposure draft (ED 1) of June 1970 had already used a threshold of 20 per cent (para. 7). No explanation is given for this level in the exposure draft.[23] There are no references to the origins of the 20 per cent threshold in the archives[24] of the ASSC or in the current memories of participants[25] in the debates. There are several comments on equity accounting in the accountancy journals[26] of the day (Titcomb, 1970; Goch, 1972), but only one can be found with any explanation of the 20 per cent: MacNair (1970, p. 367) notes that, under tax law of the time, a consortium that could share tax losses was one where equity participation was held by five or fewer companies. It was suggested that 'common interest' would be implied where such consortium relief was used.

A survey of tax and company law literature fails to reveal any other convincing source of the 20 per cent threshold. In U.K. tax law, thresholds of 10, 50 and 75 per cent can be found (Lamb, 1995, p. 37). The Companies Act 1948 had contained various thresholds other than 20 per cent; for example, 10 per cent relating to an extraordinary general meeting (s. 132(1)), 15 per cent relating to variation in rights and alteration of memorandum (ss. 72(1) and 5(2)), and 75 per cent for special resolutions (s. 141(1)).

The practices of the few British companies who used equity accounting before ED 1 may have been influential. Grand Metropolitan in its 1967 accounts reported on a number of associates held from 28 per cent to 50 per cent. A comment in

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[22] Schedule VIII, part A, para. 6(c), note (i): 'For the purpose of this Undertaking "associated company" means a company which is not a subsidiary but in which 25% or more of the equity is held by the company or, if the company has subsidiaries, by the group companies collectively (i.e. before excluding any proportion attributable to interests of outside shareholders in the subsidiaries).'

[23] Reprinted in *Accountancy*, July 1970, pp. 496–8.

[24] I am very grateful to Michael Mumford (letter to me of 29 June 1998) for examining the relevant minutes of the ASSC in the John Rylands Library.

[25] I have corresponded with Harold Edey, Michael Renshall and Chris Westwick.

[26] The author has examined contemporary issues of *Accountancy*, *The Accountant's Magazine*, *The Accountant* and *The Journal of Accountancy*.

*Accountancy* (1970a) presumed a threshold of 25 per cent, which had been used by Dunlop and by William Cory in their 1969 accounts. Other companies stressed a relationship rather than a specific threshold (Holmes, 1970, pp. 514–18). However, British Ropes adopted a specific 20 per cent threshold for the first time in its accounts issued in early 1970, before ED 1 (Holmes, 1970, p. 515). Other companies (e.g., Delta Metal; see ICAEW, 1971) used the term 'associated' for holdings of above 10 per cent, but only for disclosures not for equity accounting. It seems that the ASSC chose the lowest threshold actually used in practice for equity accounting, beginning its tradition of accommodating companies' wishes.

### *The Spread of the Threshold*

In the U.S., the APB's sub-committee on this subject initially favoured a 10 per cent threshold on the basis of what it called an 'economic interest' interpretation.[27] Some members of the sub-committee[28] and the SEC staff preferred a 25 per cent threshold on the basis of 'presumption of control', particularly over dividend payments. The board, at its meeting of March 1970, changed its position from favouring 10 per cent to 25 per cent. However, at the July meeting, it was noted[29] that the U.K.'s ED 1 proposed 20 per cent and that international coordination would be beneficial (Defliese, 1981, p. 110; Journal, 1970, p. 12). It seems that, even in the first year of operations of the U.K. standard-setter, there was an exchange of exposure drafts with the APB; and in the following year, the APB chairman was in London for discussions (Accountancy, 1971). In October 1970, the board decided on 20 per cent as an internationally coordinated compromise between its two previous views, although the SEC still did not agree.

Thus, on the basis of no clear arguments, the foundations for the eventual worldwide triumph of 20 per cent were laid. In January 1971, SSAP 1 was issued, retaining the 20 per cent. In March 1971, APB Opinion 18 (also containing 20 per cent) was issued. The U.K. press had noted[30] the earlier U.S. change to 25 per cent and then noted[31] the change to 20 per cent. However, in neither case was there any comment about the comparison with the British exposure draft's 20 per cent. This Anglo-American agreement is mirrored in a reference to a 20 per cent threshold in IAS 3 (para. 4) of 1976.

In the meantime, many other thresholds were in use internationally. As explained earlier, 25 per cent was to be found in Dutch proposals from at least 1964, and 33.3 per cent was preferred in France from 1968. However, another strand of

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[27] I am most grateful to Steve Zeff for the information in this paragraph. Professor Zeff writes in a letter to me of 8 July 1996 that he has based the information on minutes of the APB sub-committee and reports of Big 8 firms to partners after meetings of the sub-committee.

[28] The sub-committee was chaired by George R. Catlett of Arthur Andersen, but those preferring 25 per cent included representatives from Arthur Young and from Lybrand.

[29] See note 26.

[30] News section of *Accountancy*, November 1970, p. 759.

[31] News section of *Accountancy*, August 1971, p. 431.

French thinking relevant to this issue is the concept of participating interests (*participations*). From the 1966 Companies Law, these are investments of 10 per cent and above, which reminds one of the 10 per cent threshold in the U.K.'s 1967 Act noted earlier. Such investments were, and still are, to be shown separately in an investor's balance sheet in France, and one of the *régimes*[32] for group taxation treats income from such investments favourably. In Italy, a remnant of this survives, in that investments of 10 per cent or more in *listed* companies are treated as associates (Civil Code, Article 2359). This seems to accord with the APB's 'economic interest' concept.

Given the diversity of European views and the ascendancy of Anglo-American practices in the field of consolidation (Diggle and Nobes, 1994), it is not surprising that the EC Seventh Directive contained a 20 per cent threshold from its earliest published version (Article 1 (2) of the 1976 draft). This threshold has now been implemented into the laws of most of the 15 EU member states, and elsewhere in Europe (e.g., Norway, as a member of the European Economic Area). In these cases, previous thresholds for other issues have been ignored. For example, many thresholds are found in tax legislation in Europe, including 5, 10, 25 and 95 per cent (Lamb, 1995, pp. 62–73). The predominant thresholds are 10 and 25 per cent, with 20 per cent appearing rarely.[33] On other issues, German law contained a threshold of 25 per cent for blocking changes to a company's constitution and for the existence of a mutual participation (*wechselseitige Beteiligung*).[34] However, as noted above, the Italian implementation (of 1991) refers to holdings of 10 per cent in the case of listed investees. The Spanish implementation (of 1989) refers to holdings of 3 per cent in the case of listed investees (Article 185 (2), Decree 1564/1989; Gonzalo and Gallizo, 1992, p. 167). These lower thresholds are not mentioned in the Seventh Directive. However, since the Directive states that significant influence is presumed where the investor 'has 20% or more of the ... voting rights' (Article 33 (1)), a lower threshold is not specifically ruled out.

Further afield, 20 per cent is recommended in Switzerland by the standard-setters (ARR 2 of FER), and it is required in Japan by the rules of the Ministry of Finance (Financial Accounting Standards, IV, 5, 2) and in Korea (Financial Accounting Standards App. II, Art. 15(a)). Although Australia held out for years against the use of the equity method as a valuation or consolidation practice, the 20 per cent threshold was in the first exposure draft of 1971 and continued through to the eventual disclosure standard of 1988 (ASRB 1016). Turning to international standards, IAS 28 (originally of 1988) naturally followed the international consensus of 20 per cent (now in IAS 28, para. 4). Table 2 summarizes the exceptions from the 20 per cent threshold; the last two of which are extant.

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[32] The *régime des sociétés mères et filiales*.

[33] For example, the draft EC Parent/Subsidiary Directive of 1969 would relieve withholding taxes at a 20 per cent threshold, although this was changed to 25 per cent in the directive of 1990.

[34] I am grateful to Dieter Ordelheide for pointing out the blocking percentage. The mutual participation is to be found in s. 19 of Aktiengesetz 1965.

TABLE 2

SOME EXCEPTIONS FROM THE 20% FOR THE DEFINITION OF ASSOCIATES

| | |
|---|---|
| Netherlands | 25% in a government report of 1964 |
| France | 33⅓% in CNC recommendation of 1968 |
| U.S. | 10% and 25% in APB discussions in early 1970 |
| Spain | 3% for listed holdings in 1989 law |
| Italy | 10% for listed holdings in 1991 law |

### *Rebuttable Presumption*

As noted above, the numerical threshold is stated baldly in some rules, particularly those flowing from the Seventh Directive. For example, in Germany (HGB §311 (1)) and in Italy (Civil Code, Art. 2359 (3)), the assumption of significant influence rests squarely on the numerical thresholds, and no qualitative indications are given. In other jurisdictions, the rule-makers appear to have attempted to ensure that financial reporting choices rest on something less mechanical. As noted later, the problem then becomes the vagueness of the rationale for equity accounting. Some rule-makers are clear, at least, that an investor should not be able to treat an investee differently from year to year by buying and selling a few shares around the 20 per cent threshold. Consequently, in the U.S., APB Opinion 18 discusses this in terms of 'considerations' (e.g., representation on the board, and the concentration of other shareholdings) and 'presumptions' (para. 17). The same applies to IAS 3 (para. 4) and IAS 28 (para. 4).

Despite the U.S. attempt to make the threshold less stark, Mulford and Comiskey (1985) found a high concentration of investments in the 16–24 per cent range. Further, affiliates in the 19–19.99 per cent range of ownership reported losses far more often than those in the 20–20.99 per cent range.

The U.K.'s ED 1 (para. 6) contained the threshold of 'approximately 20 per cent'. The 'approximately' was removed for the original SSAP 1 (para. 6), presumably on the grounds of reducing vagueness. However, the 'rebuttable presumption' basis was introduced later (in 1982, para. 14), along U.S. lines. This was strengthened in FRS 9, where there is an extensive discussion of 'significant influence' and it is made clear that this overrides the numerical threshold (paras. 4 and 14–19). Indeed, the 20 per cent is referred to as part of 'companies legislation', suggesting that the reference to a numerical threshold would have been removed but for this. The irony here is that the 20 per cent threshold in the British law was based on the Seventh Directive which was based on the Anglo-American practice which can be traced to a British exposure draft of 1970.

## WHAT'S IN A NAME?

It is now appropriate to address a related issue: the origins of the terms 'equity method' and 'associated company'.

### *Equity Method*

'Equity method' is clearly an American coinage, and can be traced back at least to the early 1930s in the context of the arithmetic used for the preparation of consolidated balance sheets (Carman, 1932, p. 103; Dickerson and Weldon Jones, 1933, p. 200). The term can also be found later in the context of 'pseudo-consolidation' in investor statements. This is the case in Noble *et al.* (1941, p. 581) and in Finney and Miller (1952, pp. 343–5); although not in the previous edition of the latter book (Finney, 1946, p. 297). Other terms for the equity method in this context were also in use: for example, 'book value' (Paton, 1943, p. 1073; and Moonitz, 1994, p. 51), 'economic basis of accounting' (Finney, 1946, p. 297); 'book value change basis' (Moonitz and Staehling, 1950, p. 184).

In promulgated GAAP, the term was not initially used; that is, it cannot be found in ARB No. 51 of 1959 (see para. 19). However, it was employed in APB Opinion 10 of 1966: 'This practice is sometimes referred to as the "equity" method' (para. 3). By APB Opinion 18 of 1971 (para. 6), the quotation marks have disappeared. The term was then frequently used by the IASC in IAS 3 of 1976.

In the U.K., acceptance of the term is much more recent. It was not to be found in SSAP 1 (of 1971 and subsequent amendments to 1990). It does, however, appear in the EC Fourth Directive (Article 59 of the 1978 final version, but not the drafts of 1971 and 1974). Since, as noted earlier, the U.K. did not take up the Directive's option in Article 59 to use the equity method in the investor's accounts, the term was not used in the Companies Act 1981 which implemented the Directive. It is used in the Companies Act 1989,[35] though not in the EC Seventh Directive which preceded it (see Article 33). In FRS 9 of 1997 it is well established (e.g. para. 4). In Australia, the term appeared in the two exposure drafts in 1971 and 1974 (see Chambers, 1974).

The terms in French (*mise en équivalence*) and in Dutch (*intrinsieke waarde*) appear to have other origins. The French term seems to refer to the fact that the parent's and group's equity are made equal. The Dutch term refers to the valuation aspect of the method, as noted earlier. Terms in some other languages seem likely to be derived from the American (e.g., the unofficial German terms, *Equitykonsolidierung* and *Equitymethode*).

### *Associated Company*

The term 'associate' (used here to include 'associated company' and similar expressions) is not in universal use in the English-speaking world. For example, it is not to be found in U.S. authoritative literature, which refers to such enterprises elliptically.[36] The term seems to be of British origin but was originally undefined. For example, it was used by Lever Brothers in the 1920s to include subsidiaries. It also has such a meaning in British tax law.[37] It was used vaguely in the ICAEW's

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[35] Now paragraph 22 of Schedule 4A to the 1985 Act.

[36] For example, APB Opinion 18 (para. 17) refers to significant influence over an investee. In practice, the equivalent to 'associated undertaking' is an expression such as 'equity accounted investee'.

[37] For example, in the Income and Corporation Taxes Act 1970, s. 302(1), a company is associated with another if one of the two controls the other or both are under the control of the same person.

Recommendation N 20 and precisely (for disclosures) in the Stock Exchange listing requirements of 1966 (see earlier discussion). Companies used the term; for example, Grand Metropolitan in its 1967 accounts (*Accountancy*, 1968) and several others by 1970 (Holmes, 1970; ICAEW, 1971). The term then arrived in accounting standards in 1971 (international standards in 1976) and law in 1989.[38]

The term is not to be found in the Fourth Directive (where the vague 'affiliated undertakings' includes subsidiaries; and 'participating interests' includes those not significantly influenced), but 'associated undertaking' does appear in the Seventh Directive (Art. 33). The English origin seems clear enough in other language versions of the Directive; for example, *geassocieerde onderneming* in Dutch, *enterprise associée* in French, *assoziertes Unternehmen* in German, *impresa associata* in Italian and *sociedad asociada* in Spanish.

The Directive's terms survive into some EU national laws (e.g., German[39] and Spanish[40]) but not all. For example, the Italian code[41] uses *società collegata*, and no terms are used in Dutch[42] or French[43] law, merely references to significant influence.

## JOINT VENTURES

### *Definition*

It was noted above that 'semi-consolidation' was initially seen in the U.S. and the U.K. as particularly appropriate for joint ventures, with other associated investees also mentioned. Originally in the U.K. the category 'associate' included the joint venture. However, most jurisdictions now define the terms exclusively, even where the accounting treatment is to be the same.

Early French definitions of the joint venture, including that in a report of the CNC of March 1968 (CNC, 1973; Beeny, 1976, p. 47) refer to a *société fermée* (i.e., one where no shares are held outside of a group of venturers). For an investee to be a joint venture, the investor would have to hold a *participation* (i.e., at least 10 per cent of the shares). Once more, the 10 per cent threshold arises. In APB Opinion 18 (para. 3) the relevant joint venture is 'a corporation owned and operated by a small group of businesses . . . as a separate and specific business or project for the mutual benefit of the members of the group'.

The EC Seventh Directive depicts joint ventures as separate from associates, partly because different treatments are allowed (see below). The Directive's definition of joint venture (Article 32) rests on 'jointly managed'. British law (1985 Act,

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[38] The Companies Act 1981 used 'related companies' (e.g., Schedule 4, part I, B) whereas the 1989 Act has 'associated undertakings' (now para. 20 etc. of Schedule 4A to the 1985 Act).

[39] HGB § 311.

[40] Real Decreto 1815/1991, Cap. 1, art. 5.

[41] Codice civile, Art. 2359.

[42] Art. 389.

[43] Art. L357–1.

Sch. 4A, para. 19) follows these words but in FRS 9 'jointly controlled' is used, as follows: 'An entity in which the reporting entity holds an interest on a long-term basis and is jointly controlled by the reporting entity and one or more other venturers under a contractual arrangement' (para. 4).

A similar interpretation has occurred in France, where the Directive says *dirige, conjointement* but the law refers to *contrôle conjoint* (amendment in 1985 to Article 357-1 of the Law of 1966).

In what follows, joint ventures will be assumed to be entities separate from the venturers. For example, IAS 31 (para. 3) distinguishes between jointly controlled 'entities', 'operations' and 'assets'. The latter two categories create few accounting problems because the various assets and liabilities belong to the venturers, so they are included in the financial statements of the venturer (both in the individual entity statements and in the consolidated).

### *Treatment of Joint Ventures*

As noted earlier, in cases where equity accounting is used in an investor's unconsolidated financial statements for subsidiaries and associates (e.g., in Denmark and the Netherlands), then it is also used for joint ventures. This seems to create no difficulty for the Fourth Directive and various laws in the EU because joint ventures fall within the broad categories of 'affiliated' or significantly influenced undertakings. However, there is a difficulty in IAS 31, which specifically deals with joint ventures rather than associates. Strangely, IAS 31 gives no direct consideration[44] to the treatment of joint ventures in the unconsolidated statements of a venturer. That is, there is no equivalent of paragraph 29 of IAS 27 or paragraph 12 of IAS 28. Consequently, although IASs allow subsidiaries and associates to be held by the cost method in investor statements, it appears[45] that IAS 31 does not allow this for joint ventures. This seems to be an oversight.[46]

In consolidated financial statements, the treatment of joint ventures now differs internationally. U.S. and U.K. practice[47] (at least for joint ventures that are incorporated entities) is to use equity accounting on the grounds that there is significant influence but no control. In effect, joint ventures are still seen as a special case of associates, or associates are seen as a less formal type of joint venture. Consistently with this, the equity method is allowed in consolidated statements by the Seventh

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[44] Paragraph 38 is deliberately non-committal. David Cairns (IASC Secretary General at the time of IAS 31) confirms that the IASC could not agree on a single practice (letter to me of 7 July 1999). Paragraph 41, despite its heading, relates to particular joint ventures where an investor is not a venturer.

[45] Paragraph 39 requires profit made by selling from an investor to a joint venture (including a joint venture entity) to be eliminated. In practice, this requirement means that the cost method cannot be used. There is no similar requirement in IASs 27 or 28 for an investor selling to a subsidiary or an associate.

[46] The author contacted the IASC on this (9 February 1999), and there is informal acceptance of the problem. But as yet there is no action to amend the IASs.

[47] APB Opinion 18 (para. 16); the Companies Act 1985 (as amended in 1989), Sch. 4A, paras 19–22; and FRS 9 (para. 20) cover this.

Directive and by IAS 31. However, proportional consolidation is also allowed by the Directive (Article 32); and in IAS 31 (paras 25 and 33) it is *preferred* on the grounds that it 'better reflects the substance and economic reality of a venturer's interest in a jointly controlled entity, that is control over the venturer's share of the future economic benefits'. This is despite the fact that the IASC's Framework (para. 49) defines assets in terms of control over the resources not control over the benefits from the resources. It is clear that the venturer does not *control* any of the resources. Consequently, neither the resources nor part of them are assets of the venturer. The same conclusion would be arrived at even if the definition of asset had referred to control over benefits.[48]

The response to the Seventh Directive in France was to *require* proportional consolidation, which was previous French practice. In most EU member states proportional consolidation is allowed. However, this is not the case in Greece, nor in Ireland and the U.K. for corporate joint ventures. It is also not allowed for joint venture entities in Australia (AASB 1006 and 1024 and AAS 19).

In some jurisdictions where proportional consolidation is not allowed, there is nevertheless some concern about the potentially misleading nature of equity accounting for joint ventures. For example, a group would not be required to recognize its share of the liabilities of a 50 per cent held joint venture. One way of responding to this is now used in the U.K., where FRS 9 requires the use of the 'gross equity method' for joint venture entities (paras 20–1). This method, which has a precedent in FASB discussion papers,[49] involves extra disclosures on the face of the consolidated financial statements, including the investor's share of the joint venture's turnover, gross assets and gross liabilities.

### *The Reporting Entity*

This international lack of agreement on the treatment for joint ventures illustrates the need for greater clarity in some conceptual frameworks. The EC Seventh Directive has no explicit framework. The U.S. and IASC frameworks do not discuss the boundary of the reporting entity, and therefore have nothing directly to offer on consolidation issues, although the definition of asset seems relevant, as noted above. By contrast, the U.K.'s later *Statement of Principles* covers the 'reporting entity'. The boundary of the group rests on control (para. 2.6) which puts joint venture entities outside the group and therefore proportional consolidation should not be used (para. 8.9). There was a similar conclusion on the status of joint venture entities in the earlier Australian concepts statement, SAC 1.

## RATIONALES FOR THE EQUITY METHOD

Although the equity method is now used for various purposes in much of the world, the rationales for this are not well explained. The seven cases in Table 1 are examined here.

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[48] Because the definition would mean control over the services provided by the asset, not control over a share of net profit. A venturer does not control these services.

[49] I am grateful to Janie Crichton (the ASB's project director on FRS 9) for this information.

In the context of the treatment of subsidiaries in an investor's unconsolidated financial statements, the rationale for proto-consolidation (Case I) has been overtaken by the development of full consolidation. Possible rationales for pseudo-consolidation (Case II) include that the equity method is a form of accruals accounting rather than the cash accounting used by the cost method (Neuhausen, 1982, p. 62). This seems inconsistent with the realization convention but, given that Case II relates to subsidiaries, one could try to support it with a substance over form argument. Several such arguments of U.S. writers were examined earlier. A doubt, which did not concern early U.S. writers, could be raised for foreign investees where there might be uncertainties connected to the transfer of funds and the exchange rate.

A similar rationale for the equity method is that it is a form of valuation. The link is made in an Australian exposure draft where equity accounting is seen as 'a method of accounting, on an accrual basis,... thereby ensuring improved reporting on the worth of particular investments to the investor' (ASA/ICAA, 1973, para. 19). This seems to be inconsistent with the historical cost convention used in most countries, though not uniformly in some countries (e.g., Australia and the Netherlands).

For investees other than subsidiaries, pseudo-consolidation in investor statements (Cases III and IV) seems even less convincing. The substance over form argument no longer applies, as the investor controls neither the assets of the investee nor its dividend decisions. The profits of the investee (in excess of dividends) are not within the control of the investor. The basis for a threshold at 20 per cent is also unclear, particularly since the 'intrinsic value' of all investments changes as profits are made. Further, as pointed out by Paton (1951, p. 46) and discussed (along with other criticisms of the equity method) by Zambon (1996, pp. 220–5), there seems little economic significance in the 'values' arrived at by the equity method. So, the method is not a conceptually impressive way of valuing, and 'fair value' would now seem more relevant (e.g., IASC, 1997). Nevertheless, a possible defence of the method in the context of the general use of fair values would be that fair value cannot always be reliably measured (e.g., for some unlisted securities) and that large blocks of shares could not be sold at apparent market value. Of course, a large block of shares does have a fair value, although it may be more difficult to identify.

For the above Cases II to IV, the usefulness of making the parent's income and equity the same as the group's is unclear, unless the parent statements are merely unpublished worksheets.

Turning to consolidated statements, the rationale for substitute-consolidation (Case V) has also been overtaken by events in jurisdictions where all controlled investees must be consolidated. For uncontrolled investees (Cases VI and VII), the equity method could be seen again as a method of valuation, whereupon the above points on that topic apply. It could also be seen as a form of semi-consolidation. However, just as the investor does not control the investee's assets, profits or dividend decisions, neither does the group. A basic question here is: Are such investees part of the investor's group? As noted above for joint venture entities, the answer in the Australian and British frameworks is that they are clearly not. Elsewhere, the answer should be the same if the scope of the group is either based on control or majority ownership, as is the case in the U.S. (ARB 51, para. 2), the European Union (Seventh Directive, Article 1) or the IASC (IAS 27, para. 6). It seems difficult, then, to support the equity method as semi-consolidation on the basis of substance over form.

However, perhaps a rationale can be built around the idea that, above a certain threshold level of interest, the investor is in some form of special relationship with the investee. This approach, which regards associates and joint ventures as much the same, survived into the U.K. Discussion Paper in this area (ASB, 1994) which treated them both as 'strategic alliances' (para. 2.3) to be accounted for by the equity method. Later, FRS 9 (of 1997) rephrases this as follows:

> The investor needs an agreement or understanding, formal or informal, with its associate to provide the basis for its significant influence. An investor exercising significant influence will be directly involved in the operating and financial policies of this associate. Rather than passively awaiting the outcome of its investee's policies, the investor uses its associate as a medium through which it conducts a part of its activities.... Over time, the associate will generally implement policies that are consistent with the strategy of the investor and avoid implementing policies that are contrary to the investor's interests. (para. 14)

This clearly interprets the equity method as semi-consolidation, and it rests on joint control of the dividend decision even in those cases where there is not joint control of the individual assets and liabilities. It seems to suit Case VI the best, but might be extended to some associates in Case VII.

## TECHNICAL PROBLEMS RAISED BY LACK OF FRAMEWORK

Since the concept behind the equity method and the purpose of its use are unclear, it also becomes difficult to resolve technical issues. Three examples are examined: elimination of profits, presentation in income and cash flow statements, and discontinued operations.

First, when an investor makes a profit by selling to an associate which retains the goods (downstream sales), should some or all of the profit be eliminated from the investor's and the consolidated statements? The profit in the hands of the investor results form an arm's length transaction. It is realized and legally distributable, and therefore should presumably not be eliminated. The same could be said of a profit arising from a sale from a parent to a subsidiary. On consolidation, this latter profit would be eliminated because the subsidiary is part of the group, and the price (and therefore profit) of the sale was controlled by the group. Neither of these points applies to a sale to an associate, which might suggest no elimination, even in consolidated statements.

The Seventh Directive (Article 33 (7)) appears to require elimination but either total or proportional elimination seem to be allowed. In the U.K., FRS 9 (para. 31) states that there should be proportional elimination. The IASC has also recently concluded (SIC Interpretation No. 3) that there should be proportional elimination.

The problem is that, since the theory supporting the equity method is unclear, the theoretical answer on elimination is also unclear.

Another technical point is the location of the equity-accounted elements in income and cash flow statements. The basic issue is whether the amounts are to be classified as operating or as financial. In the EC Fourth Directive (e.g., Article 23, line 9), the profit from participating interests is shown after operating items and as the first financial item. This allows companies to draw the operating line above or below equity-accounted profits. In the U.K., for example, SSAP 1 did not specify the treatment, but FRS 9 (para. 27) requires equity-accounted operating profits to be shown immediately after group operating profit. For U.K. cash flow statements, dividends from associates were originally to be shown as returns on investments (FRS 1 of 1991, para. 19), then as operating activities (FRS 1 as revised in 1996, paras. 11, 14), then as a separate item between the two (FRS 1 as revised again by para. 61 of FRS 9).

The EC Seventh Directive (Article 33 (6)) could be interpreted as allowing a different position for equity-accounted income in consolidated income statements from that required under the Fourth Directive. In France, advantage has been taken of this, so that such amounts are shown after consolidated profit and before minority interests (*Plan comptable général*, p. 11.168). This suggests that such profit is neither operating nor financial.

In the U.S., APB Opinion 18 (para. 19 (c)) is unclear on the location of equity-accounted income. Burnett *et al.* (1979) found that, for twenty-two finance subsidiaries excluded from consolidation, there were five different presentations of the equity-accounted income in consolidated income statements. Modern practice still ranges from presentation as 'other income' before various operating expenses to presentation after minority interests.[50] In U.S. cash flow statements, dividends received form equity-accounted companies are generally included in operating activities (Williams, 1996, p. 4.23).

IAS 1 (para. 75, and appendix) shows equity-accounted profits after operating and financial items in income statements, whereas IAS 7 (paras 31 and 37) allows dividends from equity accounted companies to be treated as either operating or investing items in cash flow statements.

A third technical issue is the presentation of discontinued operations. There are U.S., U.K. and IASC rules in this area. The relevant issue relates to the disposal of some shares in a major subsidiary such that it becomes an associate. Assuming that the subsidiary were large enough to satisfy the size criterion for being a discontinued operation (e.g., FRS 3, para. 4), would the disposal of the shares amount to a discontinuance of the operation by the reporting entity? This issue was a matter for international debate[51] when IAS 35 was agreed in 1998. Since the reporting entity is the group, it would seem that the group has disposed of the operation, and it no longer consolidates any individual assets, liabilities, revenues or expenses. However, the IASC Board decided that is would be consistent with other equity accounting practices to regard the operation as continuing within the sphere of the group's interests. The issue is not directly addressed in IAS 35.

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[50] For example, General Electric (1996, p. 49) do the former, and General Motors (1997, p. 50 in a supplementary statement) do the latter.

[51] The author was the chairman of the IAS 35 steering committee, and chaired the IASC Board discussion leading to approval of IAS 35 in April 1998.

## SOME EMPIRICAL FINDINGS

In addition to the many writings referenced above, there has been some empirical research related to the use of the equity method. Mulford and Comiskey (1985) and Burnett *et al.* (1979) have already been mentioned. Another U.S. paper is by Ricks and Hughes (1985) who found a positive market reaction to the first publication of U.S. financial statements using the equity method. The reaction was positively correlated with size of equity earnings and degree of previous underestimate by analysts. This suggested that 'the equity method provided information concerning affiliate earnings not previously available from other sources' (p. 50).

Vallely *et al.* (1997) survey eight studies on equity accounting in Australia. Most of these examine whether management adopts aspects of equity accounting for particular reasons (e.g., attempting to increase management compensation). Mazay *et al.* (1993) suggest that the equity method may be useful in controlling management's behaviour where a material proportion of a firm's assets is in the form of investments in associates. Without the equity method, management might be able to manipulate profit by influencing dividend decisions or by non-arm's length transactions with investees. Similarly, lenders cannot reliably assess borrowers who have material investments in unlisted associates.

Another Australian paper (Czernkowski and Loftus, 1997) suggests that, in the period 1983 to 1990, the equity method provided useful information, particularly when cost-based information was also available.

## SUMMARY AND POLICY IMPLICATIONS

The equity method arose as a form of proto-consolidation for inclusion of subsidiaries (or less than fully owned subsidiaries) in parent's financial statements before the practice of consolidation was fully established. Later, the equity method was seen to be unnecessary in some jurisdictions for parent statements. However, in other jurisdictions its sporadic or generalized use is still found, such that the parent's statements contain technically unrealized profits. This pseudo-consolidation can be seen instead as a method of valuation. The term 'equity method' is an American coinage used originally in this context of investor statements. Another formerly widespread use (substitute-consolidation) relates to the treatment in consolidated statements of certain subsidiaries or controlled non-subsidiaries excluded from full consolidation.

These three uses of the equity method for the treatment of subsidiaries (Cases I, II and V of Table 1) seem to be unnecessary or unsuitable:

1. proto-consolidation, because it has been replaced by consolidation;

2. pseudo-consolidation in investor's financial statements, because any form of consolidation seems inappropriate or unhelpful and because there are convincing arguments against using the equity method as a valuation method; and
3. substitute-consolidation, because a control-based concept of the group means that all controlled enterprises should be fully consolidated.

The equity method has also been used for inclusion of joint ventures and associates in investor statements (Cases III and IV: more pseudo-consolidation or valuation) or in consolidated statements (Cases VI and VII: semi-consolidation or valuation). These uses seem to have arisen with little theoretical justification and no prior research into their usefulness. Cases III and IV seem inappropriate for the same reasons as apply to pseudo-consolidation of subsidiaries, and for some extra reasons related to lack of control. This leaves semi-consolidation, which can be divided into two categories: joint ventures (Case VI) and less formal partnerships and other holdings of 20 per cent or more (Case VII). In the U.K. and the U.S., the context for the method originally stressed joint ventures, but other associated enterprises were also included, leading to definitional problems. Terms such as 'associated company' were U.K. inventions of the 1920s onwards.

The arguments for Case VII seem the weaker of the two, particularly where there is no sense of partnership. The concept of 'significant influence' is vague and not easily operationalized; and the 20 per cent threshold is unsupported by argument, having apparently arisen pragmatically in the U.K. and been accepted in the U.S. as a compromise. Where an arbitrary threshold has to be invented in order to operationalize an accounting rule, two features generally occur in conjunction. First, there is a lack of convincing theory and, second, management will try to avoid unattractive financial reporting by making arrangements that fall above or below the threshold, as noted earlier.

An analogy to this aspect of equity accounting for associates is the capitalization of finance leases. The U.S. and U.K. rules[52] contain, *inter alia*, a threshold of 90 per cent of fair value. The German tax rules[53] (and therefore accounting practice) also contain numerical thresholds. These various rules enable management to select leases below the thresholds, which the leasing industry is happy to provide. The U.S. and U.K. thresholds can be seen as an attempt to operationalize the 'substantially all of the risks and rewards of ownership of an asset to the lessee' concept (e.g., SSAP 21, para. 15). However, this has no theoretical basis in any published conceptual framework. When the frameworks' definitions of asset and liability are applied, it becomes clear that all non-cancellable leases meet the definitions, so the arbitrary thresholds are not needed (McGregor, 1996). The U.K. standard setter, in conjunction with others, has begun a project to move in this direction (Nailor and Lennard, 1999).

Applying this analogy to equity accounting, the 'significant influence' concept is difficult to operate, which is why an arbitrary threshold (of 20 per cent) arose.

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[52] SFAS 13 (para. 7) and SSAP 21 (para. 15).

[53] See Nobes (1997, p. 64).

However, the concept is not found in the frameworks (except for the U.K.'s recent *Statement of Principles*). Further, it is clear that an application of the frameworks' definitions suggests that an associate is not part of the group and that its profits (in excess of dividends) are not group profits. This all suggests that equity accounting has little theoretical support. If equity accounting were not allowed, we would not need non-operational concepts or arbitrary thresholds. We would also not need to worry about technical problems such as the treatment of profits made on selling to associates.

Overriding all this must be a consideration of the objectives of financial statements. If one accepts the frameworks' objectives, then the issue becomes largely an empirical matter of the best prediction of future cash flows (subject to reliability). In academic writings, there is some justification for the equity method as an approximate valuation method, as a way of reducing agency problems or as a way of providing more information on earnings. However, more research is needed here.

One conclusion is that standard setters should not perpetuate operationally difficult concepts and arbitrary thresholds or group concepts which seem inconsistent with their frameworks unless they can produce evidence that the prediction of future cash flows is enhanced. One way forward would be to require all investments to be shown at fair value, taking gains and losses to comprehensive income.[54] This would replace the equity method with a more honest valuation approach and would remove arbitrary thresholds.

In practice, recent moves towards the use of fair value for investments have deliberately excluded investments in subsidiaries, joint ventures and associates (e.g., SFAS 115, para. 4; and IAS 39, para. 1a). This leads to such delicious ironies as that, under IAS accounting, a 10 per cent holding in a listed company would be held at fair value in the investor's statements, whereas a 25 per cent holding would generally[55] be valued at cost. In the group's statements, the 10 per cent holding would again be fair valued, whereas the 25 per cent holding would be equity accounted. If the latter were seen as a valuation method, it would not be a serviceable one.

Most of the above arguments also apply against using the equity method in the final remaining case: for the treatment in consolidated statements of joint ventures (Case VI) and perhaps other 'partnerships' (those associates most like joint ventures). Theoretical support has to rest on the idea that the investor exercises long-run control over its share of the profits. Another form of support comes from concern that any alternative to the equity method is worse. For example, full consolidation or proportional consolidation of individual assets of a 20 per cent holding in a joint venture or other partnership would be inconsistent with the frameworks' concept of control. At the other extreme, a cost-based method seems to be misleading as a group presentation of an interest in a 50 per cent-held joint venture. Consequently, this last case seems to be the least objectionable use of

[54] 'Comprehensive income' is the term now to be found in SFAS 130. In U.S. terms, whether such gains and losses should be shown in 'income' or 'other comprehensive income' may become a relatively trivial issue as moves are made towards a single income statement.

[55] Assuming, as in many countries, that equity accounting is not used in investors' statements.

equity accounting, and could be seen as semi-consolidation rather than valuation. The U.K.'s 'gross equity method' addresses some of the disclosure problems caused by the netting off involved in the equity method. A report of six English-speaking standard setters (the G4 + 1) concluded in a similar way about the treatment of joint ventures (Milburn and Chant, 1999, p. 25) and makes a supporting reference[56] to an earlier (1998) draft of this article.

The spread of the equity method from one use to another can be seen as part of the response of pragmatic accountants to a series of technical problems: the lack of consolidated statements, then the complications of preparing such statements, then the lack of consolidation of certain subsidiaries, then the lack of consolidation of those jointly controlled investees that were rather like subsidiaries, and so on. The spread of the equity method internationally, despite good arguments against it in several countries, should warn us that the pressures for international harmonization (that are now even stronger than in the period covered in this article) can lead to world-wide use of bad methods as well as good ones. Similarly, the international spread of the 20 per cent threshold illustrates how a pragmatically neat number, once it is supported by the two strongest accounting nations, can prosper in a theoretical vacuum.

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[56] See Milburn and Chant (1999), note 21. This refers to the 1998 draft in the form of a University of Reading discussion paper in accounting, No. 59.

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# Accounting Practice Harmony, Accounting Regulation and Firm Characteristics

Harmonization of accounting standards has been the subject of many initiatives taken at international, regional and national levels in recent years. Policy makers advancing this idea believe that accounting regulation harmony will lead to practice harmony. The literature in the area of accounting harmonization also generally relies on a similar belief.

Comparing accounting regulations and accounting practices of two countries that are pursuing a program of harmonization, Australia and New Zealand, revealed some association between the levels of regulation harmony and practice harmony. Although this indicates that regulatory harmony can improve practice harmony, the association is 'noisy', suggesting that there are also other factors affecting practice harmony. Evidence adduced here shows that accounting practice harmony is also associated with firm-specific characteristics.

**Key words:** Accounting; Harmonization; Regulation.

International financial accounting harmonization has been examined closely in recent years with the increasing interest in reducing the variations in accounting practices in different global and regional financial markets. International and regional policy makers advancing the idea of accounting harmonization suggest that accounting practice harmony is associated with accounting regulation harmony.[1]

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[1] Accounting regulation harmonization and accounting practice harmonization are often called formal harmonization and material harmonization, respectively, in the accounting harmonization literature (van der Tas, 1988; 1992b). Material harmonization refers to harmonization between practices irrespective of whether or not the practices are influenced by regulations. This simplification in terminology was made when it was realized that many accounting researchers were not fully conversant with the harmonization terminology. Tay and Parker (1990) called formal harmonization *de jure* harmonization and material harmonization *de facto* harmonization.

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Accordingly, the International Accounting Standards Committee (IASC) has produced a number of core international accounting standards (IASC, 2000). At the regional level, countries such as Australia and New Zealand are pursuing the course of harmonization of accounting standards for their common regional financial markets (Sharpe and McGregor, 1993).

Accounting harmonization research literature also relies on the notion that accounting practice harmony is related to accounting regulation harmony. This association has been examined mainly through an assessment of the move towards harmonization among certain countries, initiated by the publication of some prominent IASC standards (Nair and Frank, 1981; Evans and Taylor, 1982; Yang and Lee, 1994) and EU Directives (Doupnik and Taylor, 1985; Emenyonu and Gray, 1992).

However, concerns have been raised about the wisdom of the pursuit of harmonization as a strategy to correct market imperfections of incomparable information. Critics note that, apart from other reasons, incomparable information arises from market idiosyncrasies. Choi (1981) points out that the thesis of environmentally stimulated and justified differences in accounting runs directly counter to efforts at worldwide harmonization of accounting. Perera (1989a) provides an indication of the problems that practice harmonization efforts are likely to encounter, particularly in developing countries. Barth *et al.* (1999) find that harmonizing domestic GAAP with foreign GAAP can have deleterious effects on domestic price informativeness and trading volume.

Culture studies (e.g., Gray, 1988; Perera, 1989b), contingency studies (e.g., Doupnik and Salter, 1995), market analyses (e.g., Ball, 1995; Ball *et al.*, 1998) and market *vis-à-vis* culture analyses (Nobes, 1998), identify reasons at a macro level, that are likely to cause differences in accounting practices and systems of various countries.

Policy makers also have to be aware of the micro (firm) level reasons. Studies dealing with voluntary disclosure practices and accounting policy choice in single country contexts (e.g., see Chow and Wong-Boren, 1987; Christie, 1990) indicate that firm characteristics can influence accounting practices. This raises concern about the extent to which practice harmonization will benefit from regulation harmonization. It could be that firms may have suboptimal financial reporting if faced with regulations that are not suitable for their particular circumstances.

## PRIOR RESEARCH AND THE RATIONALE FOR THIS STUDY

Accounting harmonization is a process (van der Tas 1988; Tay and Parker, 1990) and is seen to be essential for improving international comparability in financial statements, thereby enhancing international capital flows and reducing the cost of preparing financial statements for multinational corporations (Carey, 1990; Choi and Mueller, 1992). Accounting harmonization has four essential aspects, that is, the influences, process, output and outcome. The *influences*[2] refer to the factors that have an impact on accounting practice harmonization (i.e., accounting regulation harmonization and other factors such as environmental factors and firm characteristics). The *process* refers to the actual steps taken by firms that may lead to the reduction of differences in accounting practices of two or more countries leading to a certain state of harmony (i.e., similarity in practices). The *output* refers to the product of the level of harmony at a point in time (i.e., comparable accounting information). Finally, the *outcome* refers to the consequences of harmonization (e.g., better capital market decisions). This is illustrated in Figure 1 and discussed below.[3]

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[2] These could be in the form of independent, intervening or moderating influences.

Prior research on various aspects of accounting harmonization can be broadly categorized into six groups. (These are not mutually exclusive groups, as studies at times tend to associate issues of one group to that of another.) First, a group, known as cluster studies, examined accounting practices and regulations as well as the environmental factors that influence them, in different countries. These studies have classified countries according to regulations and practices to provide morphologies of macro characteristics that differentiate country clusters (see Nobes, 1992, and Radebaugh and Gray, 1993, for reviews of these studies). Such studies have attempted to broadly evaluate both regulation and practice harmony, and the morphologies introduced by them have allowed for the exploration of reasons (i.e., environmental factors) for the level of harmonization that exists within clusters of countries. It has been argued that organizational design, including accounting systems, is influenced by cultural factors (Hofstede, 1980; Gray, 1988; Perera, 1989b; Frucot and Shearon, 1991). Doupnik and Salter (1995) empirically examined this thesis, focusing on several macro level factors. Ball (1995) and Nobes (1998) narrowed the reasons down to the nature of financing and the nature of equity market-cum-cultural differences, respectively, arguing that all the reasons previously identified in the literature are linked to these underlying reasons. However, the causality between the hypothesised reasons and the level of harmony that actually exists between countries is not as clear as would be desired by the critics of international comparative financial accounting (ICFA), such as Brown (1994) and Wallace and Gernon (1991). The nature of the impact of these reasons (*influences*, according to our classification scheme) on practice harmonization is yet to be empirically tested.

The second group of studies focuses mainly on different aspects of regulation harmonization (an *influence*). Rahman *et al.* (1996) examined the measurement of regulation harmony. Others concentrated on the reasons that give rise to different levels of regulation harmony. For example, Adhikari and Tondkar (1992) studied the association between characteristics of listed firms and the level of disclosure requirements in a stock exchange, and Cooke and Wallace (1990) examined the association between the general level of regulation and two selected environmental factors, that is, the general level of development and business environment favourableness.

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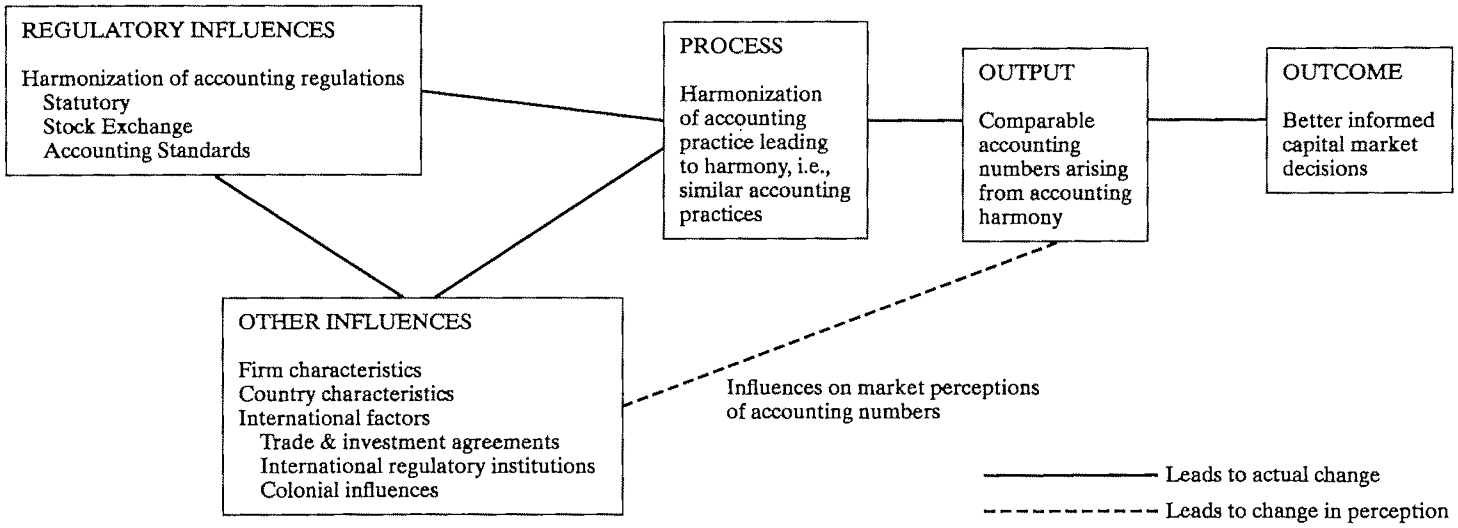
[3] The lines in Figure 1 have not been given arrowheads because we do not want to be too specific about the direction of the relationships/influences. We feel that the influences can flow in either direction and between the constituent parts of each aspect. So, for example, regulatory influences can affect practice, but while setting up regulations existing practices often influence regulatory outcomes. Again, as shown for influences, regulatory influences may also affect or be affected by other influences in addition to being related to the process variables.

FIGURE 1

ASPECTS OF ACCOUNTING HARMONIZATION


REGULATORY INFLUENCES
Harmonization of accounting regulations
Statutory
Stock Exchange
Accounting Standards
PROCESS
Harmonization of accounting practice leading to harmony, i.e., similar accounting practices
OUTPUT
Comparable accounting numbers arising from accounting harmony
OUTCOME
Better informed capital market decisions
OTHER INFLUENCES
Firm characteristics
Country characteristics
International factors
Trade & investment agreements
International regulatory institutions
Colonial influences
Influences on market perceptions of accounting numbers
Leads to actual change
Leads to change in perception

The third group investigates (a) accounting practice harmony at a point in time (e.g., van der Tas, 1988; Walton, 1992; Emenyonu and Gray, 1992; Herrmann and Thomas, 1995), and (b) accounting practice harmonization (the *process*), through measurement of movements in harmony over a period of time (e.g., Nair and Frank, 1981; Evans and Taylor, 1982; van der Tas 1992b; Yang and Lee, 1994; Archer *et al.*, 1995). In most cases, the objective has been to evaluate the impact of the efforts of regulation harmonization (an *influence*) at global and regional levels. For example, Nair and Frank (1981) and Evans and Taylor (1982) examined the impact of IASC initiatives on global accounting practices; and Walton (1992), Emenyonu and Gray (1992) and van der Tas (1992b), studied the impact of EU Fourth Directive on accounting practice harmonization of certain European countries. Some others have investigated the impact of global initiatives on harmonization at regional level. For example, Doupnik and Taylor (1985) and Yang and Lee (1994) studied the trends towards harmonization by Western European and Pan Pacific countries, respectively, in response to IASC standards. The underlying assumption in most of these studies has been that changes in practice are caused by regulatory changes. There are two problems here. First, they do not study the effects of the varying strengths of different national regulatory regimes that may give rise to different practices even if the rules are similar. Second, they provide little explanation for the differing levels of harmony between countries, which could have arisen due to other environmental differences, for example, differences in industry features.

The fourth group examines the relation between accounting practice harmonization (the *process*) and accounting numbers such as profit and key financial ratios (the *output*) (Gray, 1980; Choi, 1983; Weetman and Gray, 1990; 1991; Hellman, 1993). They identified countries that were perceived as having low regulation harmony and attempted to see whether the practice differences arising from lack of regulation harmony affected reported income. This assumes that the variations in regulation among countries give rise to differences in accounting numbers produced by firms of those countries. No other country specific variables that may affect the preparation of accounting numbers were studied.

The fifth group shifts the focus to the association of regulation harmonization (an *influence*) or practice harmonization (the *process*) with share prices (an *outcome*). They have examined the relationship between share returns and earnings computed through the use of accounting rules of different countries (e.g., Alford *et al.*, 1993, Amir *et al.*, 1993; Barth and Clinch, 1996; Harris *et al.*, 1994; Bandyopadhyay *et al.*, 1994). Focus is on a particular regulatory initiative, the need for SEC to require U.S. GAAP reconciliation from overseas firms listed on the U.S. stock exchanges. Similar to accounting practice harmonization and accounting numbers studies, these studies also rely on the assumption that accounting practice harmonization is associated with accounting regulation harmonization, which is translated into share price variations (the *outcome*).[4] Ball *et al.* (1998) have extended the market-based research into accounting harmonization. Studying the market relevance of accounting earnings in common-law and code-law countries, they found that the different institutional factors in the two types of countries did influence the value relevance of earnings. This work introduces a means of testing the influence of environmental variables on at least one *outcome* of accounting, market reactions to accounting information.

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[4] A more recent study, Barth *et al.* (1999), measured the effects of formal harmonization on price informativeness and trading volume.

Finally, the sixth group considers the concerns about accounting practice harmony measurement techniques raised in the literature (Tay and Parker, 1990, 1992; van der Tas, 1992a) and tried to improve the methodology in that respect. The harmony measures proposed rely on comparing practices between firms of the same country or practices of firms in different countries, taking one reporting issue at a time. These studies do not try to propose techniques that can determine composite practice harmony measures for information sets. Such composite measures would give an indication of the overall nature of accounting practice harmony in a category of information, for example, fixed assets or inventories (a type of measure that is used in this study).

Figure 1 emulates the premise, supported by Gray (1988), Perera (1989b), Doupnik and Salter (1995), Ball (1995) and Nobes (1998), that there are various environmental factors (*other influences*) that influence accounting systems and practices. According to their delineation, the levels of accounting practice harmony are not only dependent on the levels of accounting regulation harmony, but also on the levels of harmony that exist for other influencing factors. The factors identified by these studies are generally at the macro level. Empirical studies in single country contexts, such as Chow and Wong-Boren (1987), Craswell and Taylor (1992), indicate that factors at the micro level, that is, firm-specific variables, also have explanatory and predictive power in relation to a firm's disclosure or accounting policy choice behaviour.[5] Figure 1 depicts the influence of such firm specific and environmental factors on accounting numbers generated by firms, and hence the level of accounting harmony.

The country level environmental factors and the firm characteristics may also influence how the markets perceive the accounting numbers (shown by the dotted line in Figure 1). For example, in certain countries where taxation influences accounting rules and practices, markets may perceive accounting numbers as inconsequential for decision-making purposes. Likewise, annual accounts of large firms may be of less significance to investors than annual accounts of small firms, because information about large firms is available from many easily accessible sources prior to the publication of their annual reports.

This article focuses on two of the issues discussed above. It proposes to (a) empirically test the validity of the assumption that practice harmony is associated with regulation harmony and (b) establish with empirical support whether there are factors other than regulation harmony that are associated with practice harmony. The results will help in understanding the relation between practice harmony and regulation harmony, which is likely to have implications for efforts at harmonizing accounting regulations internationally. Although harmonization is a process, to keep the investigation manageable, this work only attempts to analyse the state of harmony in a single year.[6]

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[5] Refer to Christie (1990) for a detailed review of the literature.

This analysis does not take into account the macro level environmental factors external to the firm, such as culture, form of equity market or sociopolitical variables, and actually controls for such variables by comparing the practices of two countries, Australia and New Zealand, that are very similar in respect of these variables.

Australia and New Zealand are partners in the Closer Economic Relations (CER) agreement signed in 1983. The purpose of the CER Agreement is to harmonize laws and conventions between the two countries to improve trans-Tasman trade and investment. The efforts under this agreement, strengthened by the similarities in the two countries' economic, legal and accounting infrastructures, have led to demands for uniformity in the regulations and regulatory mechanisms of the two countries (Holmes *et al.*, 1986; Lloyd, 1991). In this context, the results reported here would be of use to policy makers of the two countries. Further, the insights gained would also be of value to other country groupings or global regulators, such as the IASC and IOSCO, who are involved in optimizing the outcome of accounting harmonization.

## HYPOTHESES

### *Association Between Practice Harmony and Regulation Harmony*

Mitnick (1980) defined regulation as 'the intentional restriction of a subject's choice of activity, by an entity not directly party to or involved in the activity' (p. 20). In the case of accounting, accounting rules of institutions such as the government, accounting bodies and stock exchanges, impose restrictions on the way accounting can be conducted. Thus, one could argue that the same rules applied in two countries should bring about complete standardization of practices between them. However, since accounting rules vary in strength, this may not necessarily be the case. There are many rules that allow multiple options in dealing with matters relating to disclosure and measurement while there are others that allow only one option or prohibit some options. Further, not all rules are enforced in a similar manner. For example, while some accounting rules such as statutory requirements are part of law, others that are promulgated by professional accounting bodies may or may not have statutory support. Finally, there are rules that are formulations of self-governing institutions such as the stock exchange listing requirements. This indicates that not only what the rules require but also how effectively the rules are enforced can influence the level of practice disharmony between countries (Rahman *et al.*, 1996). Consequently:

H1: *Ceteris paribus*, the level of practice harmony is positively associated with the level of regulation harmony.

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[6] See Archer *et al.* (1996) for an elaborate discussion on certain methods of measuring harmonization.

H2: *Ceteris paribus*, the association between practice harmony and regulation harmony is higher when the regulations are strongly enforced in the countries concerned.

Likewise,

H3: *Ceteris paribus*, the level of practice harmony is low when there is no regulation.

### *Association Between Firm-Specific Characteristics and Practice Harmony*

In addition to regulation, firms make accounting disclosures and policy choices for other reasons and this can also lead to differences in practices (Radebaugh and Gray, 1993, pp. 143, 182–5; Mueller *et al.*, 1997, pp. 55–6). Efficient contracting, signalling and expectation adjustment opportunities are commonly cited as the reasons for voluntary disclosure and measurement practices of firms (Yeo, 1995). Strict regulations are believed to have sub-optimal effects on the efficiency of the markets and management contracts. Regulators, therefore, allow sufficient scope for disclosure and measurement choices within the accounting rules. So with or without regulations, disclosure and measurement practices may vary between firms for a variety of reasons.

Positive accounting research shows that firms with different characteristics will adopt different disclosure and measurement practices (Watts and Zimmerman, 1986). This has implications for harmonization of accounting practices across countries. Attempts to harmonize accounting practices through regulatory harmonization, without making provision for varying firm characteristics, are likely to be unsuccessful. Another consequence of this would be that some firms might be compelled to produce information that is not relevant for their circumstances, causing them to incur additional costs unnecessarily.

It has been noted that 'accounting choice varies by industry', indicating that it is an important firm characteristic (Watts, 1992, p. 241). Research in the single country context has shown that there are industry effects on accounting practices. Earlier examinations of positive accounting theory (e.g., Watts and Zimmerman, 1978) were criticized for not recognizing industry effects, and later studies tried to control for industry (e.g., Daley and Vigeland, 1983). The industry effects on disclosure and measurement practices could be due to many reasons including other firm characteristics, for example, size and growth prospects, which themselves are associated with disclosure and accounting policy choice. The nature of activities within an industry could also be a reason for the diversity in both the amount and type of disclosure and measurement practices among firms. Accordingly:

H4: *Ceteris paribus*, the level of practice harmony is not independent of industry.

Firm size is an important determinant of disclosure and accounting policy choice. Both single-country and multi-country studies have shown that large firms disclose more information than small firms (Gray *et al.*, 1995; Hossain *et al.*, 1995). Policy choice behaviours of firms of different sizes have also been examined in many works (Christie, 1990). Apart from the reasons often discussed in the literature to explain disclosure (e.g., political cost), it could simply be that large firms have a greater amount as well as variety of activities than small firms, leading to greater variability in practices among them as they have more to disclose. Similarly, large firms will have a greater need for using a variety of accounting policies. Therefore, across countries there will be a higher variability of disclosure and measurement practices for large firms than for small firms. Consequently:

H5: *Ceteris paribus*, the level of practice harmony is negatively associated with size.

Ownership concentration is also seen as a factor affecting disclosure of information (Wong, 1988). Firms with lower shareholder concentration disclose more. Firms with greater financial disclosure would also have greater variety of items and will also be using a greater variety of measurement techniques. Therefore, firms with lower shareholder concentration will have a higher between-country variability in disclosure and measurement practices. Accordingly:

H6: *Ceteris paribus*, the level of practice harmony is positively associated with ownership concentration.

The agency theory literature suggests that leverage is positively associated with greater disclosure. However, the empirical evidence does not support this view (Chow and Wong-Boren, 1987; Craswell and Taylor, 1992; Hossain *et al.*, 1995). Taking a market-based view, Ball (1995) suggests that the association will be negative. Drawing on the signalling literature, Ball argues that financing through equity requires greater disclosure than financing through debt, as it requires more dissemination of information. The current work takes Ball's view as an exploratory measure, although it is yet to be tested in disclosure studies in single country contexts. On this view, firms having higher equity would be disclosing more information in terms of both amount and variety.[7] This in turn will lead to more measurement methods being used and greater variety in the use of measurement methods. The consequence of this would be greater variability in the use of disclosure and measurement methods between firms of two countries when equity financing is higher in comparison to debt financing. Therefore:

H7: *Ceteris paribus*, the level of practice harmony is positively associated with leverage.

Jensen (1983) argued that accounting and organizational form are related, and noted that organizational innovations of the early 1900s that led to the creation of large multi-divisional firms were accompanied by substantial innovations in accounting practices. Hay (1998) explained that audited financial reports in the New Zealand public sector were a direct consequence of decentralization. Hence, the level of organizational decentralization can be another factor affecting both the level and variety of disclosure as well as measurement practices of firms in different countries. Accordingly:

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[7] Nobes (1998) expresses similar views as Ball, but both Ball and Nobes express their views in terms of countries. They both broadly suggest that differences in the finance markets will lead to differences in disclosure or differences in accounting systems. This study investigates whether the capital structures of firms are associated with practice harmony.

H8: *Ceteris paribus*, the level of practice harmony is negatively associated with the level of decentralization.

Managers are known to engage Big-6[8] auditing firms for monitoring purposes so that they can reduce bonding costs (Hossain *et al.*, 1995). Big-6 auditors are multinational auditors and they are perceived to have high standards of practice; which they tend to use across countries (Radebaugh and Gray, 1993). This can be a reason for greater harmony for those companies that are audited by Big-6 auditors. Therefore:

H9: *Ceteris paribus*, the level of practice harmony is higher for Big-6 audited firms.

Given that practice harmony is associated with regulation harmony (H1 to H3), it can be posited that firm characteristics will have a greater influence on practice harmony for items that are disclosed voluntarily than for mandatory disclosure items. Therefore:

H10: *Ceteris paribus*, the aforementioned associations between practice harmony and firm characteristics (H4 to H9) are greater for voluntary disclosures than for mandatory disclosures.

Since there is no single theory of harmonization that supports all of the above hypotheses and the hypotheses have been drawn from a range of theories dealing with accounting regulations, disclosure and measurement, no attempt is made to incorporate the hypotheses into a single causal (regression) model.[9] Also, without a coherent theory it is difficult to identify whether the variables are independent, intervening or moderating in nature.

The hypotheses are summarized in Table 1.

The practice harmony measure used here is a broad measure of variability. It is felt that a broad variability measure is the best possible means of judging how practice harmony is associated with a range of characteristic types. An exact harmony measure would normally require likes to be compared with likes, that is, companies with the same firm features. Such a comparison is not only impossible because of the problems of controlling for so many different firm features, but also contrary to the purpose of this research as it purports to show that, apart from regulations, the variations in firm features themselves can cause harmony or disharmony.

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[8] Since the collection of data for this article the number of large multinational audit firms has dropped to five. To maintain consistency with the data, we chose to continue to use the term Big 6.

[9] Other variables that can affect disclosure and measurement behaviour of firms in the international context include multinational listing and extent of multinational operations. Although one can say that these variables should not be used as they may be related to size, the reason why these variables have not been used in this study is that most companies in the sample did not have such features.

TABLE 1

THE HYPOTHESES

**Panel A: Association between practice harmony and regulation harmony**

| | Hypotheses for:<br>Level of regulation harmony | Level of enforcement | No regulation |
|---|---|---|---|
| Level of practice harmony | Positive association (H1) | Higher positive association for H1 (H2) | Low practice harmony (H3)* |

**Panel B: Association between practice harmony and firm characteristics**

| | Mandatory disclosure categories | Mandatory measurement categories | Voluntary disclosure categories |
|---|---|---|---|
| Industry (H4) | Not independent | Not independent | Not independent** |
| Size (H5) | Negative association | Negative association | Negative association** |
| Ownership concentration (H6) | Positive association | Positive association | Positive association** |
| Leverage (H7) | Positive association | Positive association | Positive association** |
| Decentralization (H8) | Negative association | Negative association | Negative association** |
| Auditor type/size (Big-6 vs. Non-Big-6) (H9) | Positive association | Positive association | Positive association** |

* The question of association does not arise in this case as the disclosure will be voluntary, not regulated.
** Level of significance will be higher than that for mandatory disclosure and measurement (H10).

## DATA COLLECTION

The countries compared here are Australia and New Zealand, which have similar accounting environments. Broad comparisons of the accounting standards (Sharpe and McGregor, 1993) and detailed comparison of accounting regulatory mechanisms (Rahman *et al.*, 1994) show that, in general, the accounting regulatory environments of the two countries are similar. They are also very similar culturally (Gray, 1988) and in terms of capital market features (Nobes, 1998). Such similarities between them will allow for the control of three significant environmental variables, regulatory systems, culture and capital markets.

The accounting practices and firm characteristics data were collected by perusing the 1993 annual reports of the top hundred listed companies,[10] according to market capitalization, of Australia and New Zealand. The choice of 1993 for data collection was due to the fact that in New Zealand it was the last year that annual reports were prepared according to accounting standards that did not have statutory backing. This leads to the presumption that although the regulatory systems of the two countries were generally similar, the rule enforcement for accounting standards that broadly govern measurement rules was weaker in New Zealand than in Australia. This situation provides us with data that are suitable for testing H2. The disclosure data for 1993 for both countries were primarily mandatory in nature as they were based mainly on statutes and mandatory listing requirements for all listed firms, and the measurement data were statutorily backed in Australia but not in New Zealand.

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[10] Tay and Parker (1992) highlighted the need for using actual published company information rather than databases created for other purposes, to overcome earlier criticisms such as those found in Nobes (1981).

Accounting practices according to all the accounting requirements applicable to listed companies in Australia and New Zealand were included in the comparison. As stated in the Closer Economic Relations (CER) agreement of 1983 between Australia and New Zealand (Reports to Governments by Steering Committee of Officials, 1992), listed companies are important players in the international capital markets, and for that reason they are of immediate concern for the purposes of business regulation harmonization.

The top hundred companies in both countries, excluding banking and insurance companies, were written to for their annual reports.[11] In all, data were collected from eighty-one New Zealand and seventy-five Australian companies.

Mandatory disclosure and measurement data were collected using the instrument of Rahman *et al.* (1996), that included requirements of the relevant acts, listing rules and accounting standards that existed in 1993. The instrument was adapted to include only those requirements for which information would normally be available from annual reports. Table 2 shows the main categories used in the study. The mandatory categories were created on the basis of actual rules of statutes, stock exchange listing rules and accounting standards. So information about definitions of elements of financial information, which was sought by Rahman *et al.* (1996) for comparing the rule of Australia and New Zealand, were dropped from the instrument. The instrument used for procuring non-mandatory information was adapted from Gray *et al.* (1995). In all, data for a total of 889 items consisting of sixty-one mandatory categories (thirty-three disclosure categories and twenty-eight measurement categories) and fourteen non-mandatory categories were collected. All items and categories were treated equally irrespective of their importance for predictive and accountability purposes, as it was considered that weighting would be arbitrary and not contribute much to the results (see Hossain *et al.*, 1995).

The information for each item of disclosure or measurement within the categories was collected on a dichotomy of '1' and '0'. A '1' was recorded when a company disclosed a particular item or used a particular measurement method, and a '0' was recorded when a company did not disclose an item or did not use a particular measurement method. For cases where it could be identified that a company was not disclosing an item or using a method of measurement because it did not have to (e.g., a company did not have to make group disclosures because it was not

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[11] The instrument for this study was inappropriate for banking and insurance companies as they had reporting regimes that were unique to their business circumstances.

TABLE 2

SCHEDULE OF DISCLOSURE AND MEASUREMENT CATEGORIES

| Sl. No. | Disclosure requirements |
|---|---|
| D1 | General Issues |
| D2 | Profit and Loss disclosures |
| D3 | Other Profit and Loss items—Expense |
| D4 | Format of statements |
| | Balance Sheet disclosures: |
| D5 | Receivables |
| D6 | Inventories |
| D7 | Investments |
| D8 | Property, Plant and Equipment |
| D9 | Leases |
| D10 | Intangibles |
| D11 | Liabilities (current and non-current) |
| D12 | Other disclosures with respect to liabilities |
| D13 | Provisions |
| D14 | Share Capital |
| D15 | Reserves |
| D16 | Other supplementary disclosure with respect to assets and liabilities |
| D17 | Accounting Policy |
| D18 | Foreign Currency |
| D19 | Segments |
| D20 | Construction Contracts |
| D21 | Extractive Industry |
| D22 | Earnings per Share |
| D23 | Miscellaneous Disclosure |
| | Group Accounts: |
| D24 | Consolidated Statements |
| D25 | Equity Accounting |
| D26 | Joint Ventures |
| D27 | Partnerships |
| D28 | Related Party Disclosures |
| | Cash Flow Information: |
| D29 | Cash flows related to operating activities |
| D30 | Cash flows related to investing activities |
| D31 | Cash flows related to financing activities |
| D32 | Other P & L Disclosure—Income |
| D33 | Other P & L Disclosure—Miscellaneous |

| Sl. No. | Measurement requirements |
|---|---|
| M1 | Fixed Assets (New Zealand)/Non-Current Assets (Australia) |
| M2 | Depreciation of Fixed/Non-Current Assets |
| M3 | Leases |
| M4 | Inventories |
| M5 | Investment Properties |
| M6 | Properties intended for sale |
| M7 | Joint Ventures |
| M8 | Partnerships |
| M9 | Debt Defeasance |
| M10 | Set-Off of Debt |
| M11 | Subsequent Events |
| M12 | Contingencies |
| M13 | Research and Development |
| M14 | Expenditure Carried Forward |
| M15 | Accounting for Tax |
| M16 | Extraordinary Items and Prior Period Adjustments |
| M17 | Cash Flow Information |
| M18 | Consolidation |
| M19 | Foreign Currency |
| M20 | Segments |
| M21 | Related Party Disclosure |
| M22 | Construction Contracts |
| M23 | Extractive Industry |
| M24 | Marketable Securities |
| M25 | Pensions |
| M26 | Livestock |
| M27 | Bloodstock |
| M28 | Earnings per Share |

| | Voluntary Disclosure Items |
|---|---|
| V1 | General Corporate Information |
| V2 | Acquisition and Disposal of Investments |
| V3 | Financial Overview |
| V4 | Research and Development |
| V5 | Future Prospect |
| V6 | Employee Information |
| V7 | Social Reporting and Value Added Information |
| V8 | Segmental Reporting |
| V9 | Foreign Currency |
| V10 | Capital Market Data |
| V11 | Information About Directors |
| V12 | Information About Overseas Listing |
| V13 | Product/Service Quality Information |
| V14 | Provisions |

*Note*: The Sl. Nos used in this table are the same as those used in Tables 4 and Figures 2 and 3.
*Source*: Adapted from Rahman *et al.* (1996).

a holding company), a blank was assigned. Such cases were excluded from the analyses.

The typology used to examine the association between accounting regulations and accounting practice is as follows[12]:

*Type 1: Required* for all listed companies, i.e., requirements of the statutes, stock exchange listing requirements and accounting standards.
*Type 2: Recommended or suggested* by the statutes, stock exchange listing requirements, accounting standards, accounting guidelines (Australia) and technical practice aids (New Zealand).
*Type 3: Allowed or not required or not prohibited* by the above requirements.
*Type 4: Not permitted* by the statutes, stock exchange listing requirements and accounting standards.

The proxies used for measuring firm characteristics or classifying the firms are as follows:

| Characteristic | Types |
|---|---|
| Industry | 1 = Primary; 2 = Manufacturing; 3 = Service; 4 = Extractive; 5 = Property and Investment; 6 = Other. |
| Size | Total assets in N.Z.$. Large = above the mean for all firms within one's own country; Small = below the mean for all firms within one's own country. |
| Ownership concentration | Ownership of top 20 shareholders in %. High = above the mean for all firms within one's own country; Low = below the mean for all firms within one's own country. |
| Leverage | Debt–Equity ratio. %. High = above the mean for all firms within one's own country; Low = below the mean for all firms within one's own country. |
| Decentralization | Number of subsidiaries and associates. High = above the mean for all firms within one's own country; Low = below the mean for all firms within one's own country. |
| Auditor type | 1 = Big 6; 0 = Others. |

For some of these variables, researchers have also used proxies other than those identified above. For example, for size, market capitalization or turnover has often been used instead of total assets. However, for consistency in terms of the time of the release of the data, the proxies chosen are those that were all readily available from a single document, in this case the annual report.

## ANALYTICAL METHOD

Various items of information combine to form the whole information set within a published annual report. These items are the outputs of several separate categories of accounting treatments. For example, there are disclosure and measurement treatments for categories such as fixed assets, inventories and consolidations. Since accounting practices encompass many disclosure and measurement items, which are grouped under several categories, there is a need for comparative techniques to measure comprehensively the level of harmony in respect of each category and for several such categories.

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[12] Rahman *et al.* (1996) used this typology to identify the nature of regulations.

Consequently, the following steps are taken in this article. First, it introduces methods to compare comprehensively accounting practices of the two countries by categories of items of disclosure and measurement. And second, it investigates the associations between regulation harmony and practice harmony as well as between firm-specific characteristics and practice harmony.

### *Accounting Practice Harmony by Categories*

Comparison of accounting practices between Australia and New Zealand was carried out by categories of mandatory disclosure items, mandatory measurement items and voluntary disclosure items. A matching coefficient known as Jaccard coefficient was used to measure accounting practice harmony. Jaccard coefficient is useful in measuring the degree of likeness between two sets of binary observations (Krzanowski, 1990, p. 27). Two types of Jaccard coefficients were computed for each category of disclosure and measurement items. The first measured the extent of likeness between the disclosure and measurement practices that were *adopted* by companies in the two countries, and the other measured the degree of likeness for items that were *not adopted* in the two countries.

As mentioned earlier, the disclosure and measurement observations were coded as '1' for disclosing an information or using a particular measurement method and '0' for not disclosing an information or not using a particular measurement method. To observe the likeness in practices in a category between New Zealand and Australian companies, the data for the practices for all items within a category of each New Zealand company were compared with the same data of each Australian company in the following manner:

| | | $j^{th}$ Australian company | |
|---|---|---|---|
| | | 1 | 0 |
| $i^{th}$ New Zealand company | 1 | *a* | *b* |
| | 0 | *c* | *d* |

This matrix shows the four possible pair-wise comparisons between two companies of the two countries. Here, *a* and *d* represent the number of matches within a category for a pair of companies, with *a* being number of matches when both companies *adopted* a practice and *d* being number of matches when both companies *did not adopt* a practice. *b* and *c* represent the number of mismatches within a category for a pair of companies. The data for items of disclosure and measurement that were not applicable to a company were excluded from this analysis.

Jaccard coefficient for each company pair for similarity in practices *adopted* in a category (JACC1) is given by

$$D1_{ij} = \frac{a}{a+b+c}$$

Jaccard coefficient for each company pair for similarity in practices *not adopted* in a category (JACC2) is given by

$$D2_{ij} = \frac{d}{b+c+d}$$

Jaccard coefficient for all company pairs in a category, the average of the Jaccard coefficients of all those pairs, is given by,

$$JACC1 = \frac{\sum_{i=1}^{m}\sum_{j=1}^{n} D1_{ij}}{N_i \cdot N_j}$$

$$JACC2 = \frac{\sum_{i=1}^{m}\sum_{j=1}^{n} D2_{ij}}{N_i \cdot N_j}$$

The matching coefficients for similarity in practices that were adopted (JACC1) are more useful for understanding accounting practice harmony than those that were not adopted (JACC2) because in the case of practices that were not adopted it is very hard to identify why the companies were not adopting them. The non-adoption could be due to regulations prohibiting such practices or, as mentioned earlier, a firm not having the activities related to such practices.[13] Moreover, matching of non-adoption, that is, both countries having '0' for an item, was inappropriate for requirements that had more than two options. Such matches would give misleading results because, say, if a requirement had three options, companies may choose two different options and yet have a third option that would match because both companies would have '0' for that option. This match is not really a match, but the Jaccard coefficient (JACC2) would see it as a match. Nevertheless, it was necessary to compute the second set of Jaccard coefficients (JACC2) to identify any significant association of rules prohibiting certain practices.

### *Association Between Regulation Harmony and Practice Harmony*

Jaccard coefficients for practice harmony were compared with matching coefficients that measured regulation harmony between Australia and New Zealand. Two forms of regulation harmony matching coefficients were computed for each category of disclosure and measurement. The first (MATCH1) compared the regulations of the two countries that required or recommended the use of certain practices, and the second (MATCH2) compared the regulations that prohibited the use of certain practices. These matching coefficients are basically similar to those of Rahman *et al.* (1996, p. 332) in that they show what proportion of the rules of the two countries actually match within each category. They are different from those of Rahman *et al.* only in one respect. The 'allowed/not required' category (Type 3 regulations) matches were excluded when both countries allowed or did not require certain practices, as it may not influence practice harmony.[14] Rather, presence of such rules for an item on both sides may encourage more diversity.

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[13] As mentioned earlier, attempts were made to exclude non-disclosures for absence of activities. However, it was not possible to identify such non-disclosures in many cases.

Correlation between MATCH1 and JACC1, and MATCH2 and JACC2 were mapped and computed to examine the association between regulation harmony and practice harmony. The correlation between MATCH1 and JACC1 would indicate the association of harmony in required disclosure and measurement rules with harmony in practices that are being adopted. The correlation between MATCH2 and JACC2 would indicate the association of harmony in disclosure and measurement rules prohibiting certain practices with the similarity in non-adoption of certain practices in the two countries.

### *Association Between Firm-Specific Characteristics and Practice Harmony*

The association between firm specific characteristics and accounting practice harmony was evaluated by ascertaining whether the aforementioned Jaccard coefficients were independent of the firm characteristics. The firm characteristics were divided into two or more types. For example, industry was divided into six industry types mentioned earlier and size was divided into two types: large (above the mean size in a country) and small (below the mean size in a country). (See Data Collection section for the types of each characteristic.)

*T*-tests (for metric data) and chi-square tests (for non-metric data) indicated that most firm characteristics for the two countries were not significantly different. The only characteristic for which there was significant difference was decentralization (number of subsidiaries and associates) where the means for the two countries were different at a level of significance of .001 or less. Given the similarity between the characteristics, the criteria of within-country means for categorizing firms into certain characteristic types (e.g., large and small firms or high and low shareholder concentration firms) were used.

For every category of disclosure and measurement items, Jaccard coefficients were computed for each characteristic type for every characteristic. Then for every characteristic, the category types were ranked by the value of their Jaccard coefficients for each category of disclosure and measurement items. Chi-square tests were conducted to see whether the Jaccard rankings for the categories were independent of the characteristic types. If the rankings were found *not* to be independent of the types for a characteristic it was inferred that accounting practice harmony was associated with that firm characteristic.

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[14] Rahman *et al.* (1996) used the MATCH coefficients for comparing the rules and not to ascertain the impact of rule differences on practice. They also used Mahalanobis distance. Both Mahalanobis distance and MATCH coefficients correlate very closely and it is very difficult to judge which of the two would provide a better indicator of impact of regulation harmony on practice. This study uses MATCH coefficients because it is based on similar principles as JACCARD coefficients.

## RESULTS

### *Descriptive Statistics*

Table 3 provides descriptive statistics about the firm characteristics of New Zealand and Australian companies. Chi-square and *t*-tests show that the characteristics of the two countries vary significantly (significance level $\leq 0.01$) for industry and debt equity ratio. Although firm size means for the two countries are quite different, the difference between them is not statistically significant because the spread in the firm sizes (see standard deviation in Panel B of Table 3) is quite large. Considering the fact that only the top hundred companies of the two countries were examined, the standard deviations indicate that for small countries, such as Australia and New Zealand, company size can vary considerably even for the largest companies.

### *Association Between Practice Harmony and Regulation Harmony (H1, H2 and H3)*

Table 4 and Figures 2 and 3 provide statistics about accounting practice harmony (JACC1 and JACC2). JACC2 results, although provided, were not used for judging practice harmony, as the earlier misgiving about JACC2 seems to apply. A

TABLE 3

DESCRIPTIVE STATISTICS

**Panel A: Distribution of firms by industries**

| | Primary | Mfg | Service | Extract | Property | Other |
|---|---|---|---|---|---|---|
| Aust. | 7 | 42 | 28 | 24 | 1 | 26 |
| N.Z. | 13 | 29 | 30 | 8 | 7 | 30 |
| | 20 | 71 | 58 | 32 | 8 | 56 |

$\chi^2$ *p* value = 0.0054
*Note*: Several firms were in more than one industry.

**Panel B: Firm characteristics**

| Firm attributes | N.Z. | Aust. | N.Z. | Aust. | *t*-test |
|---|---|---|---|---|---|
| | Mean | | Standard deviation | | *p* value |
| Firm size (Total asset $ in million) | 1206.83 | 3135.04 | 3665.75 | 5557.43 | 0.3336 |
| Ownership concentration (% of shares held by top twenty shareholders) | 75.23 | 67.25 | 15.78 | 18.15 | 0.9964 |
| Leverage (debt–equity ratio in %) | 75.29 | 82.32 | 59.70 | 62.11 | 0.0001 |
| Decentralization (number of subsidiaries and associates) | 18.93 | 75.72 | 42.10 | 108.28 | 0.0539 |
| Auditor type (% of firms having Big-6 auditors) | 88.00 | 89.30 | | | $\chi^2$ *p* value<br>0.7220 |

### TABLE 4

### FORMAL AND MATERIAL HARMONIZATION

| Sl. No.[a] | NVAR | NZN | OZN | MATCH1 | JACC1 | MATCH2 | JACC2 |
|---|---|---|---|---|---|---|---|
| **Panel A: By mandatory disclosure categories** | | | | | | | |
| D1 | 18 | 79 | 74 | 0.500 | 0.735 | 0.000 | 0.570 |
| D2 | 24 | 39 | 54 | 0.708 | 0.531 | 0.000 | 0.478 |
| D3 | 31 | 49 | 57 | 0.484 | 0.414 | 0.000 | 0.377 |
| D4 | 16 | 76 | 73 | 0.250 | 0.380 | 0.000 | 0.728 |
| D5 | 20 | 49 | 67 | 0.550 | 0.270 | 0.000 | 0.656 |
| D6 | 10 | 33 | 57 | 0.700 | 0.511 | 0.000 | 0.491 |
| D7 | 28 | 16 | 37 | 0.321 | 0.279 | 0.000 | 0.600 |
| D8 | 20 | 45 | 61 | 0.800 | 0.602 | 0.000 | 0.420 |
| D9 | 12 | 8 | 27 | 0.818 | 0.359 | 0.333 | 0.570 |
| D10 | 11 | 38 | 63 | 0.455 | 0.285 | 0.000 | 0.614 |
| D11 | 21 | 59 | 69 | 0.619 | 0.319 | 0.000 | 0.528 |
| D12 | 21 | 46 | 50 | 0.381 | 0.162 | 0.000 | 0.687 |
| D13 | | 0 | 0 | | | | |
| D14 | 19 | 60 | 4 | 0.474 | 0.431 | 0.000 | 0.691 |
| D15 | 8 | 78 | 72 | 0.375 | 0.441 | 0.000 | 0.690 |
| D16 | 10 | 70 | 73 | 0.200 | 0.481 | 0.000 | 0.510 |
| D17 | 7 | 61 | 70 | 1.000 | 0.685 | | 0.452 |
| D18 | 7 | 61 | 63 | 0.429 | 0.541 | 0.000 | 0.319 |
| D19 | 9 | 36 | 62 | 1.000 | 0.567 | | 0.421 |
| D20 | | 0 | 0 | | | | |
| D21 | 13 | 14 | 40 | 0.462 | 0.289 | 0.000 | 0.428 |
| D22 | 5 | 43 | 72 | 0.600 | 0.369 | 0.000 | 0.784 |
| D23 | 14 | 27 | 28 | 0.286 | 0.119 | 0.000 | 0.747 |
| D24 | 31 | 49 | 55 | 0.367 | 0.289 | 0.050 | 0.603 |
| D25 | 11 | 30 | 60 | 0.818 | 0.168 | 0.000 | 0.562 |
| D26 | 8 | 25 | 51 | 0.625 | 0.292 | 0.000 | 0.589 |
| D27 | 13 | 4 | 34 | 0.000 | 0.144 | 0.000 | 0.770 |
| D28 | 33 | 12 | 51 | 0.727 | 0.397 | 0.000 | 0.469 |
| D29 | 9 | 78 | 75 | 1.000 | 0.476 | | 0.546 |
| D30 | 10 | 78 | 73 | 1.000 | 0.535 | | 0.687 |
| D31 | 9 | 76 | 74 | 0.778 | 0.601 | 0.000 | 0.230 |
| D32 | 15 | 68 | 68 | 0.467 | 0.305 | 0.000 | 0.391 |
| D33 | 15 | 42 | 53 | 0.467 | 0.276 | 0.000 | 0.618 |
| **Panel B: By mandatory measurement categories** | | | | | | | |
| M1 | 27 | 34 | 43 | 0.417 | 0.234 | 0.176 | 0.591 |
| M2 | 19 | 35 | 46 | 0.421 | 0.600 | 0.000 | 0.690 |
| M3 | 24 | 27 | 26 | 0.667 | 0.116 | 0.000 | 0.813 |
| M4 | 15 | 57 | 62 | 0.615 | 0.452 | 0.286 | 0.771 |
| M5 | 9 | 7 | 37 | 0.111 | 0.113 | 0.000 | 0.705 |
| M6 | 8 | 4 | 38 | 0.250 | 0.044 | 0.000 | 0.750 |
| M7 | 4 | 19 | 41 | 1.000 | 0.245 | 1.000 | 0.610 |

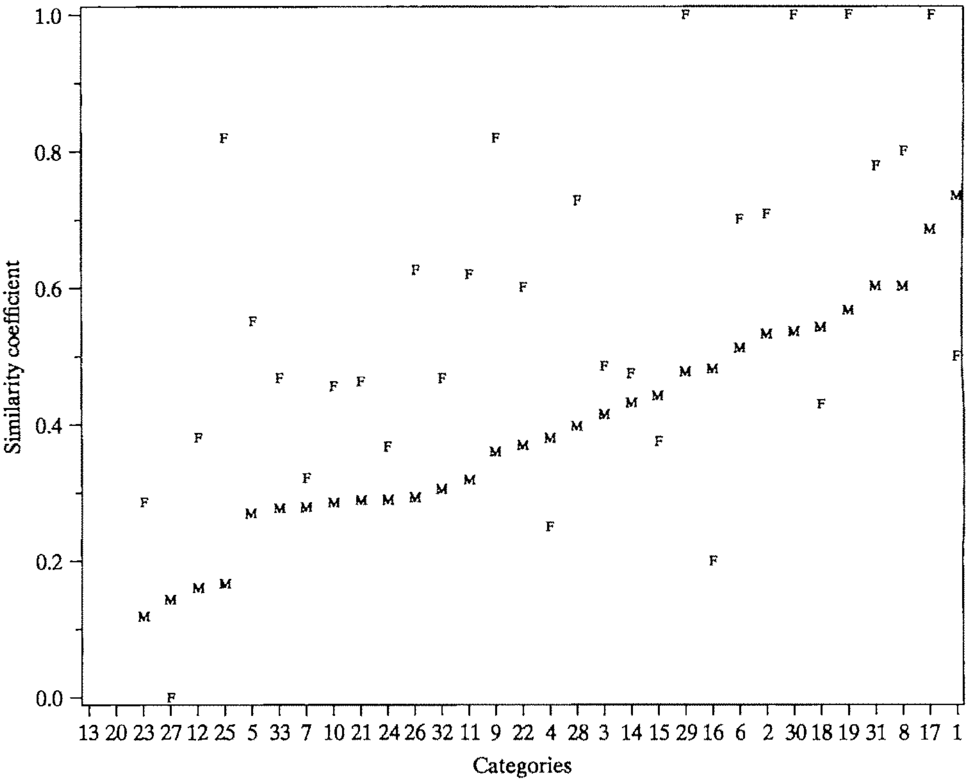
TABLE 4 (Continued)

| Sl. No.[a] | NVAR | NZN | OZN | MATCH1 | JACC1 | MATCH2 | JACC2 |
|---|---|---|---|---|---|---|---|
| **Panel B: By mandatory measurement categories** | | | | | | | |
| M8 | 4 | 3 | 47 | 0.000 | 0.068 | 0.000 | 0.570 |
| M9 | 5 | 26 | 52 | 0.800 | 0.000 | 0.000 | 0.989 |
| M10 | 1 | 27 | 53 | 1.000 | 0.001 | | 0.927 |
| M11 | 2 | 31 | 57 | 0.500 | 0.089 | 0.000 | 0.700 |
| M12 | 10 | 32 | 48 | 0.000 | 0.373 | 0.000 | 0.797 |
| M13 | 9 | 18 | 51 | 0.875 | 0.349 | 0.500 | 0.710 |
| M14 | 12 | 42 | 53 | 0.300 | 0.349 | 0.222 | 0.807 |
| M15 | 12 | 40 | 50 | 0.500 | 0.358 | 0.000 | 0.564 |
| M16 | 5 | 48 | 49 | 0.500 | 0.359 | 0.333 | 0.734 |
| M17 | 9 | 71 | 73 | 0.750 | 0.571 | 0.333 | 0.572 |
| M18 | 37 | 33 | 40 | 0.833 | 0.317 | 0.143 | 0.630 |
| M19 | 25 | 24 | 36 | 0.571 | 0.208 | 0.308 | 0.677 |
| M20 | 14 | 22 | 48 | 1.000 | 0.414 | 1.000 | 0.583 |
| M21 | 5 | 62 | 75 | 1.000 | 0.540 | | 0.389 |
| M22 | 3 | 23 | 52 | 1.000 | 0.004 | | 0.885 |
| M23 | 13 | 5 | 32 | 0.538 | 0.169 | 0.000 | 0.682 |
| M24 | 8 | 24 | 56 | 0.000 | 0.295 | 0.500 | 0.738 |
| M25 | 3 | 18 | 60 | 0.000 | 0.014 | 0.000 | 0.796 |
| M26 | 6 | 5 | 23 | 0.000 | 0.096 | 0.000 | 0.629 |
| M27 | 6 | 80 | 22 | 0.000 | 0.000 | 0.000 | 0.000 |
| M28 | 4 | 64 | 71 | 0.500 | 0.197 | 0.000 | 0.781 |
| **Panel C: By voluntary disclosure categories** | | | | | | | |
| V1 | 11 | 80 | 75 | No requirements | 0.395 | No requirements | 0.354 |
| V2 | 4 | 79 | 73 | | 0.078 | | 0.625 |
| V3 | 17 | 79 | 75 | | 0.269 | | 0.628 |
| V4 | 5 | 80 | 75 | | 0.063 | | 0.701 |
| V5 | 15 | 80 | 75 | | 0.173 | | 0.759 |
| V6 | 16 | 80 | 75 | | 0.189 | | 0.779 |
| V7 | 7 | 80 | 75 | | 0.026 | | 0.781 |
| V8 | 7 | 65 | 74 | | 0.165 | | 0.542 |
| V9 | 4 | 76 | 74 | | 0.022 | | 0.730 |
| V10 | 4 | 80 | 75 | | 0.303 | | 0.417 |
| V11 | 4 | 80 | 75 | | 0.528 | | 0.174 |
| V12 | 3 | 78 | 74 | | 0.002 | | 0.940 |
| V13 | 3 | 80 | 75 | | 0.305 | | 0.501 |
| V14 | 2 | 80 | 75 | | 0.010 | | 0.786 |

[a] See Table 2 for category names.
NVAR = Number of items in a category of disclosure or measurement items.
NZN = Number of New Zealand companies.
OZN = Number of Australian companies.
MATCH1 = Matching of Type 1 and Type 2 requirements of disclosure and measurement regulations.
JACC1 = Matching of disclosure and measurement practices adopted.
MATCH2 = Matching of Type 4 requirements of disclosure and measurement regulations.
JACC2 = Matching of disclosure and measurement practices not adopted.

FIGURE 2

ASSOCIATION BETWEEN REGULATION HARMONY AND PRACTICE HARMONY—MANDATORY DISCLOSURE CATEGORIES (MATCH1 WITH JACC1)



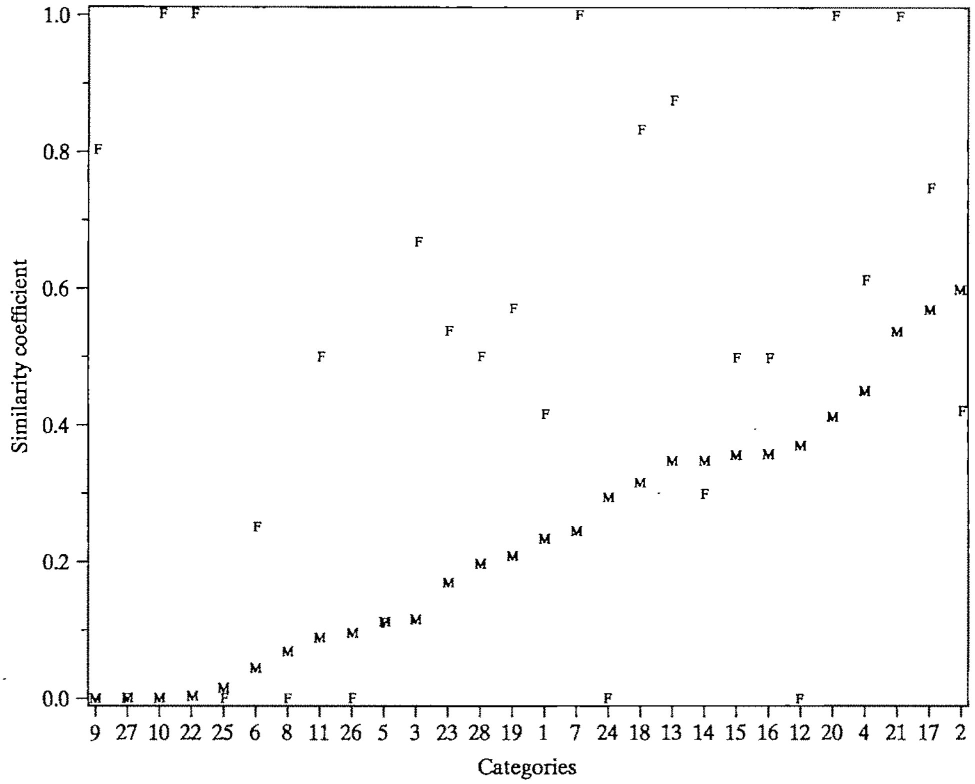
Correlation (MATCH1 with JACC1) = 0.5142 ($p$ = 0.0031).
F = Regulation (formal) harmonization.
M = Practice (material) harmonization.

careful examination of the data revealed that JACC2 was not indicative of the effects of prohibitive restrictions. It seems that the prohibitive requirements have been overshadowed by other factors in influencing practice harmony for 'not adopted' items. It is almost impossible to tell from the annual reports why the items were not adopted.

Figures 2 and 3 map the Jaccard coefficients (JACC1) of practice harmony with matching coefficients of regulation harmony. Figure 2 shows that there is a highly significant correlation between disclosure regulation harmony and disclosure practice harmony. The correlation coefficient is 0.5142 ($p$ = 0.0031). Figure 3 shows some (but not significant) correlation between regulation measurement harmony and

FIGURE 3

ASSOCIATION BETWEEN REGULATION HARMONY AND PRACTICE HARMONY—MANDATORY MEASUREMENT CATEGORIES (MATCH1 WITH JACC1)



Correlation (MATCH1 with JACC1) = 0.2386 ($p = 0.2214$).
F = Regulation (formal) harmonization.
M = Practice (material) harmonization.

practice measurement harmony. The correlation coefficient is 0.2386 ($p = 0.2214$). In regard to both mandatory disclosure and mandatory measurement the results show a positive association between the level of practice harmony and the level of regulation harmony. Therefore, there is reasonable support for H1.

Figures 2 and 3 also support H2. Figure 2 is about mandatory disclosure practices and Figure 3 is about mandatory measurement practices. Government statutes and stock exchange listing requirements, both of which are enforced by law in both Australia and New Zealand, mainly drive the mandatory disclosure practices. The close relation between regulation harmony and practice harmony in this case indicates that for categories that had similar rules the enforcement strength of the

Table 5

PAIRED SAMPLES TESTS BETWEEN PRACTICE HARMONIES OF MANDATORY DISCLOSURE, MANDATORY MEASUREMENT AND VOLUNTARY DISCLOSURE CATEGORIES

| | | JACC1 mean | *t* | *df* | Sig. (2-tailed) |
|---|---|---|---|---|---|
| Pair 1 | Mandatory disclosure—mandatory measurement | 0.395258<br>0.234821 | 4.097 | 25 | .000 |
| Pair 2 | Mandatory measurement—voluntary disclosure | 0.234821<br>0.180571 | .469 | 13 | .647 |
| Pair 3 | Mandatory disclosure—voluntary disclosure | 0.395258<br>0.180571 | 4.362 | 12 | .001 |

state ensured practices to be similar. However, mandatory measurement requirements are mostly rules of accounting standards. Australia has had statutory backing for accounting standards since 1984; however, New Zealand standards had not yet received statutory support when the data for this study were collected. Therefore, for mandatory measurement, rule enforcement was stronger in Australia than in New Zealand. This is one of the likely reasons for practice harmony to be weaker for mandatory measurement items than for mandatory disclosure items. This view is further substantiated by the results in Table 5, which show that the mean JACC1 for mandatory measurement is lower than the mean JACC1 for mandatory disclosure at a significance level of $\leq .001$.

Table 5 provides partial support for H3. It shows that the mean JACC1 for voluntary disclosure was lower than the mean JACC1 for mandatory disclosure at a significance level of $\leq .001$. However, the difference between the mean JACC1 for voluntary disclosure was not significantly below the mean JACC1 for mandatory measurement. The overall picture one gets from Table 5 and Figures 2 and 3 is that practice harmony is lower when there is less regulation and less regulation harmony. This is consistent with practice harmony being associated with regulation harmony.

### *Association Between Firm-Specific Characteristics and Practice Harmony (H4 to H10)*

The relevant tables and the chi-square test statistics are shown in Tables 6, Panels A to F. There are three tables for every characteristic, one for mandatory disclosure categories, one for mandatory measurement categories and one for voluntary disclosure categories. Columns represent category types, for example industry types, large and small firms, high or low shareholder concentration. The rows represent the number of categories for which a characteristic type achieved a particular rank by JACC1. For example, in Table 6, Panel A1, Primary Industry (an industry type) had rank 1 for 11 categories and rank 2 for 7 categories and so on, for mandatory disclosure items. Once all such rankings were compiled for all industry types, chi-square tests were conducted to see whether or not the ranks and industry types were associated. In Table 6, Panel A1, their association was highly significant.

Results illustrated in Table 6 provide a mixed but strong indication that accounting practice harmony is also associated with firm characteristics, especially when regulation harmony is weak or where there are no regulations. The $p$ values of chi-square statistics indicate that practice harmony is not independent of industry (Table 6, Panel A). Therefore, there is sufficient support for H4. Size and ownership

TABLE 6

ASSOCIATION BETWEEN PRACTICE HARMONY AND FIRM CHARACTERISTICS

**Panel A: Association between practice harmony and industry types**

Rankings by Jaccard coefficients for mandatory disclosure categories

| | Industry | | | | | | |
|---|---|---|---|---|---|---|---|
| Rank by JACC1 | Primary (Number of categories) | Manfg | Service | Extract | Prop & inv | Others | Total |

1: Association between mandatory disclosure practice harmony and industry types

| Rank by JACC1 | Primary | Manfg | Service | Extract | Prop & inv | Others | Total |
|---|---|---|---|---|---|---|---|
| 1 | 11 | 4 | 3 | 3 | 3 | 8 | 32 |
| 2 | 7 | 10 | 4 | 4 | 3 | 2 | 30 |
| 3 | 5 | 9 | 6 | 3 | 2 | 5 | 30 |
| 4 | 3 | 6 | 10 | 2 | 4 | 4 | 29 |
| 5 | 1 | 2 | 5 | 11 | 4 | 6 | 29 |
| 6 | 4 | 0 | 3 | 8 | 15 | 6 | 36 |
| Total | 31 | 31 | 31 | 31 | 31 | 31 | 186 |

$\chi^2$ $p$ value = 4.83377E-06 ** $\chi^2 = 69.33161$

2: Association between mandatory measurement practice harmony and industry types

| Rank by JACC1 | Primary | Manfg | Service | Extract | Prop & inv | Others | Total |
|---|---|---|---|---|---|---|---|
| 1 | 10 | 3 | 1 | 6 | 1 | 5 | 26 |
| 2 | 4 | 11 | 5 | 1 | 3 | 1 | 25 |
| 3 | 1 | 7 | 4 | 1 | 4 | 6 | 23 |
| 4 | 4 | 3 | 4 | 5 | 2 | 4 | 22 |
| 5 | 2 | 2 | 6 | 1 | 6 | 3 | 20 |
| 6 | 5 | 0 | 6 | 12 | 10 | 7 | 40 |
| Total | 26 | 26 | 26 | 26 | 26 | 26 | 156 |

$\chi^2$ $p$ value = 0.000111035 ** $\chi^2 = 59.81033$

3: Association between voluntary disclosure practice harmony and industry types

| Rank by JACC1 | Primary | Manfg | Service | Extract | Prop & inv | Others | Total |
|---|---|---|---|---|---|---|---|
| 1 | 6 | 1 | 3 | 0 | 1 | 3 | 14 |
| 2 | 0 | 8 | 1 | 0 | 1 | 4 | 14 |
| 3 | 1 | 4 | 3 | 1 | 1 | 3 | 13 |
| 4 | 4 | 0 | 4 | 1 | 2 | 2 | 13 |
| 5 | 1 | 1 | 3 | 3 | 4 | 1 | 13 |
| 6 | 2 | 0 | 0 | 9 | 5 | 1 | 17 |
| Total | 14 | 14 | 14 | 14 | 14 | 14 | 84 |

$\chi^2$ $p$ value = 9.30473E-06 ** $\chi = 67.39625$

TABLE 6 (Continued)

**Panel B: Association between practice harmony and firm size**

| | Rankings by Jaccard coefficients for mandatory disclosure categories | | |
|---|---|---|---|
| Rank by JACC1 | Large | Small | Total |
| | (Number of categories) | | |
| 1: Association between mandatory disclosure practice harmony and firm size | | | |
| 1 | 11 | 20 | 31 |
| 2 | 20 | 11 | 31 |
| Total | 31 | 31 | 62 |
| $\chi^2$ *p* value = 0.022254128 $\chi^2$ = 5.225806 | | | |
| 2: Association between mandatory measurement practice harmony and firm size | | | |
| 1 | 10 | 15 | 25 |
| 2 | 15 | 10 | 25 |
| Total | 25 | 25 | 50 |
| $\chi^2$ *p* value = 0.157299265 $\chi^2$ = 2 | | | |
| 3: Association between voluntary disclosure practice harmony and firm size | | | |
| 1 | 0 | 14 | 14 |
| 2 | 14 | 0 | 14 |
| Total | 14 | 14 | 28 |

$\chi^2$ *p* value = 1.21315E-07 ** $\chi^2$ = 28
Large > Mean of total assets of all firms in a country.
Small < Mean of total assets of all firms in a country.

**Panel C: Association between practice harmony and ownership concentration**

| | Rankings by Jaccard coefficients for mandatory disclosure categories | | |
|---|---|---|---|
| Rank by JACC1 | High | Low | Total |
| | (Number of categories) | | |
| 1: Association between mandatory disclosure practice harmony and ownership concentration | | | |
| 1 | 13 | 18 | 31 |
| 2 | 18 | 13 | 31 |
| Total | 31 | 31 | 62 |
| $\chi^2$ *p* value = 0.204084281 $\chi^2$ = 1.612903 | | | |
| 2: Association between mandatory measurement practice harmony and ownership concentration | | | |
| 1 | 13 | 12 | 25 |
| 2 | 12 | 13 | 25 |
| Total | 25 | 25 | 50 |
| $\chi^2$ *p* value = 0.777297411 $\chi^2$ = 0.08 | | | |
| 3: Association between voluntary disclosure practice harmony and ownership concentration | | | |
| 1 | 11 | 3 | 14 |
| 2 | 3 | 11 | 14 |
| Total | 14 | 14 | 28 |

$\chi^2$ *p* value = 0.002496909 ** $\chi^2$ = 9.142857
High > Mean of % shares held by top 20 shareholders of all firms in a country.
Low < Mean of % shares held by top 20 shareholders of all firms in a country.

TABLE 6 (Continued)

**Panel D: Association between practice harmony and leverage**

| Rank by JACC1 | Rankings by Jaccard coefficients for mandatory disclosure categories<br>High | Low<br>(Number of categories) | Total |
|---|---|---|---|
| 1: Association between mandatory disclosure practice harmony and leverage | | | |
| 1 | 10 | 21 | 31 |
| 2 | 21 | 10 | 31 |
| Total | 31 | 31 | 62 |
| $\chi^2$ *p* value = 0.005206003 ** $\chi^2 = 7.806452$ | | | |
| 2: Association between mandatory measurement practice harmony and leverage | | | |
| 1 | 16 | 12 | 28 |
| 2 | 12 | 16 | 28 |
| Total | 28 | 28 | 56 |
| $\chi^2$ *p* value = 0.285049646 $\chi^2 = 1.142857$ | | | |
| 3: Association between voluntary disclosure practice harmony and leverage | | | |
| 1 | 5 | 9 | 14 |
| 2 | 9 | 5 | 14 |
| Total | 14 | 14 | 28 |

$\chi^2$ *p* value = 0.130570066 $\chi^2 = 2.285714$
High > Mean of leverage of all firms in a country.
Low < Mean of leverage of all firms in a country.

**Panel E: Association between practice harmony and decentralization**

| Rank by JACC1 | Rankings by Jaccard coefficients for mandatory disclosure categories<br>High | Low<br>(Number of categories) | Total |
|---|---|---|---|
| 1: Association between mandatory disclosure practice harmony and decentralization | | | |
| 1 | 4 | 27 | 31 |
| 2 | 27 | 4 | 31 |
| Total | 31 | 31 | 62 |
| $\chi^2$ *p* value = 5.1576E-09 ** $\chi^2 = 34.12903$ | | | |
| 2: Association between mandatory measurement practice harmony and decentralization | | | |
| 1 | 6 | 20 | 26 |
| 2 | 20 | 6 | 26 |
| Total | 26 | 26 | 52 |
| $\chi^2$ *p* value = 0.000103217 ** $\chi^2 = 15.07692$ | | | |
| 3: Association between voluntary disclosure practice harmony and decentralization | | | |
| 1 | 0 | 14 | 14 |
| 2 | 14 | 0 | 14 |
| Total | 14 | 14 | 28 |

$\chi^2$ *p* value = 1.21315E-07 ** $\chi^2 = 28$
High > Mean of number of subsidiaries of all firms in a country.
Low < Mean of number of subsidiaries of all firms in a country.

TABLE 6 (Continued)

**Panel F: Association between practice harmony and auditor type**

| | Rankings by Jaccard coefficients for mandatory disclosure categories | | |
|---|---|---|---|
| Rank by JACC1 | Big-6 | Non-Big-6 (Number of categories) | Total |
| 1: Association between mandatory disclosure practice harmony and auditor type | | | |
| 1 | 20 | 11 | 31 |
| 2 | 11 | 20 | 31 |
| Total | 31 | 31 | 62 |
| $\chi^2$ $p$ value = 0.022254128 $\chi^2 = 5.225806$ | | | |
| 2: Association between mandatory measurement practice harmony and auditor type | | | |
| 1 | 19 | 6 | 25 |
| 2 | 6 | 19 | 25 |
| Total | 25 | 25 | 50 |
| $\chi^2$ $p$ value = 0.000236034 ** $\chi^2 = 13.52$ | | | |
| 3: Association between voluntary disclosure practice harmony and auditor type | | | |
| 1 | 12 | 2 | 14 |
| 2 | 2 | 12 | 14 |
| Total | 14 | 14 | 28 |

$\chi^2$ $p$ value = 0.000157052 ** $\chi^2 = 14.28571$
* Significant at significance level < .10.
** Significant at significance level < .05.

concentration seemed not to be associated with practice harmony for mandatory categories, but were associated for voluntary disclosure categories as hypothesized, showing a mixed support for H5 and H6. H7 is rejected because leverage was negatively associated with practice harmony for mandatory disclosure categories and had no significant association for mandatory measurement and voluntary disclosure categories. As for decentralization, H8 is supported, that is, the number of subsidiaries was negatively associated with practice harmony. There was strong support for auditor type, H9. For mandatory measurement and voluntary disclosure auditor type was positively associated with practice harmony. Even for mandatory disclosure the association was positive, but not significant.

Finally, significant associations were found for five of the six firm characteristic hypotheses for voluntary disclosure categories. The case was different for mandatory categories where only three of the hypotheses in both disclosure and measurement categories had support. The results, therefore, signify that the association between firm characteristics and practice harmony is higher for voluntary items than for mandatory items, providing support for H10.

Table 7 shows the summary results for hypotheses H4 to H10.

TABLE 7

RESULTS: ASSOCIATION BETWEEN PRACTICE HARMONY AND FIRM CHARACTERISTICS

| | Mandatory disclosure categories | Mandatory measurement categories | Voluntary disclosure categories |
|---|---|---|---|
| Industry (H4) | Yes** | Yes** | Yes** |
| Size (H5) | No (correct sign) | No (correct sign) | Yes** |
| Ownership concentration (H6) | No (wrong sign) | No (correct sign) | Yes* |
| Leverage (H7) | No* | No (correct sign) | No (wrong sign) |
| Decentralization (H8) | Yes** | Yes** | Yes** |
| Auditor type/size (Big-6 vs Non-Big-6) (H9) | No (correct sign) | Yes** | Yes** |

Yes = Confirmation of the hypothesis.
No = Rejection of the hypothesis.
* = Significance level ≤ .01.
** = Significance level ≤ .001.
The associations between practice harmony and firm characteristics (H4 to H9) are more frequent for voluntary disclosures than for mandatory disclosures (H10).

## CONCLUSION

This article analyses the factors that are associated with accounting practice harmonization. The results indicate that accounting practice harmony is associated with both accounting regulation harmony and firm characteristics. This indicates that rule creation and rule enforcement on their own may not necessarily bring about market, contract and social efficiencies, the main reasons often cited in the literature for regulation and regulation harmonization. The association between firm specific characteristics and accounting practice harmony suggests that caution needs to be exercised in aiming to achieve practice harmony through regulation harmonization. This closely resembles expressions of caution found in previous studies, which have suggested that environmental idiosyncrasies of different countries are important factors in the accounting harmonization process (e.g., Choi, 1981; Perera, 1989a; Ball, 1995; Nobes, 1998; Barth *et al.*, 1999). This study adds to these convictions the role of firm specific characteristics as important influences in the harmonization process. Therefore, it is reasonable to recommend that regulators should not overlook the firm specific idiosyncrasies of individual countries in harmonizing accounting standards.

The results also show that multinational auditors (Big-6 firms) play a role in accounting practice harmonization. It was the multinational auditors who in the early 1970s clamoured for the establishment of the IASC and they still are the main supporters of the IASC. The nature and the reasons for their support for harmonization need further investigation. This would allow regulators to understand to what extent auditors can help in the harmonization process.

The suggestion that it is important to pay adequate attention to the firm-related factors in formulating strategies to improve the comparability of accounting numbers has policy implications. While the study identifies the areas where accounting practice harmony has been achieved between Australia and New Zealand, it also shows areas where more effort is needed. For example, some categories of disclosure and measurement have more and others have less harmony. A category-by-category examination of the level of harmony would provide the policy makers or standard-setters with useful insights into the firm specific reasons for the harmonization situation of the two countries. In areas where there are large variations in firm characteristics between the two countries, practice harmonization through regulation may not be achievable. In such cases, mutual recognition, where the two countries accept the use of each other's standards for cross-border purposes, would be a more appropriate strategy.

Finally, the absence of a coherent and comprehensive theory of accounting harmonization poses a problem in setting up a single empirical model to study the harmonization behaviour. Attempts to develop such a theory have been made by Doupnik and Salter (1995), using a combination of perspectives such as culture and other environmental views, and Nobes (1998) using the cultural and market perspectives. Although the current work makes no attempt to produce a general theory, it adds to these explanations by providing a firm-characteristics-based explanation.

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# Corporate Lobbying Behaviour on Accounting for Stock-Based Compensation: Venue and Format Choices

This article investigates U.S. corporate lobbying of the Financial Accounting Standards Board (FASB) in the U.S. on the exposure draft to Financial Accounting Standard No. 123 (FAS 123), *Accounting for Stock-Based Compensation*. Essentially, firms lobbied the FASB in one of three ways: (a) against disclosure/recognition of any additional information beyond that already required in U.S. proxy statements, (b) for summary footnote disclosure of all employee stock-based compensation (SBC), or (c) for either pro forma or formal income statement recognition of all employee SBC.

This study finds that the higher the level of the SBC of the top five executives, the less likely firms are to favour disclosing that information. This finding supports the hypothesis that economic self-interests motivated lobbying behaviour on FAS 123. Furthermore, the study finds that U.S. corporations lobby against disclosure of executive SBC in the annual reports even when the annual reports would disclose no additional information beyond that currently disclosed in proxy statements. This is evidence that managers perceive that the venue of disclosure (proxy versus annual report) matters. It is posited that managers lobbied against disclosure of SBC to avoid possible changes to compensation contracts which in turn could adversely affect stock prices. In sum, the results support the notion that managerial self-interest affects lobbying behaviour on the venue as well as the format of disclosure.

**Key words:** Accounting; Compensation; Lobbying; Stock.

Because financial accounting affects the allocation of scarce economic resources, stakeholders (e.g., management, government or shareholders) have an interest in shaping nascent accounting standards. Prior studies have examined whether managers lobby the U.S. Financial Accounting Standards Board (FASB) in their own economic self-interests rather than in the interests of other stakeholders. Research in this area has focused on whether managers lobby for or against standards calling for proposed financial statement *recognition* of an accounting item based on the economic cost to the management. Other research examines management's

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disclosure choices in proxy statements. For example, Lewellen *et al.* (1996), Murphy (1996), Yermack (1998), and Baker (1999) report that firms choose methods of valuation of stock options in proxy statements that report lower values when management compensation is 'excessive'. This choice suggests that managers' valuation choices for SBC are based on economic self-interests. Other research on lobbying behaviour and the effect of a proposed financial accounting standard on pro forma net income provides mixed results. For example, Watts and Zimmerman (1978) report that economic self-interests motivate large firms to lobby for an accounting standard that reduces pro forma net income. Yet, other studies (e.g., Martens and Stevens, 1993; Dechow *et al.*, 1996) find no relationship between lobbying behaviour and the effect of the proposed standard on net income. The present study extends prior research by examining whether economic self-interests affect corporate lobbying on disclosure, especially on (a) whether to disclose similar or identical information in proxy statements versus annual reports (i.e., a venue choice between proxy and annual report), and on (b) the choice between disclosing via summary information in the footnotes versus disclosing via pro forma income statements (i.e., a format choice within the annual report).

Prior to the 1993 Exposure Draft (ED) on FAS 123, *Accounting for Stock-Based Compensation*, corporations provided relatively little information on the value of stock-based compensation (SBC) held by top management. Essentially, corporations reported the SBC for only the top five executives and only in annual proxy statements as required by the U.S. Securities and Exchange Commission (SEC). The ED proposed recognizing for the first time in annual reports the amount of SBC for all employees.[1] Comment letters to the FASB on FAS 123 almost exclusively opposed *recognition* of SBC. However, as Walker and Robinson (1993) note, a careful analysis of the substance of comment letters (i.e., analysis beyond simply counting 'yes/no' votes on recognition) can provide additional insights into the politics of the standard-setting process. The current analysis of the comment letters reveals that managers supported varying venues and formats of *disclosure*. Thus, the varying responses to the FASB on the ED for FAS 123 provide a unique opportunity to examine whether economic self-interest motivates lobbying on venues and formats of disclosure of information.

The results of this study indicate that differences in corporate lobbying positions on disclosure are related to the value of corporate SBC. In particular, the more wealth management holds in the form of stock options, the more likely managers will oppose disclosing SBC information in the annual reports, even though proxy statements already disclose SBC information for the top five executives of the firm. Further, this result holds true even when the top five managers hold virtually all of the employee SBC, and therefore already disclose most of total SBC in proxy statements. These results reflect lobbying on venue choice.[2]

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[1] Under the prior required (and still allowable) accounting in the U.S. for stock-based compensation, Accounting Principles Board Opinion No. 25 (APB 25), firms recognized no expense related to fixed stock option plans. (For a number of reasons, mostly tax-related, the most common type of stock-based compensation plan in the U.S. is a fixed plan.) In contrast to APB 25, FAS 123 requires recognition of the expense related to all types of stock option plans, including fixed, which reduces corporate income. (A discussion of the differences between the proposed accounting for stock-based compensation [FAS 123] and APB 25 is included in the Appendix.)

The study also finds that managers' economic self-interest explains lobbying on summary disclosure of SBC versus pro forma recognition of SBC. This reflects lobbying on format choice. Summary disclosure includes footnote details of SBC for all employees, similar to that reported in the proxy statement for the top five executives (including, for example, grant price and date, exercise price, number of options, and net realizable value of options). Corporations that grant relatively more SBC are more likely to lobby for summary footnote disclosure rather than pro forma recognition of SBC.

## MOTIVATION AND HYPOTHESIS DEVELOPMENT

While it seems clear that economic self-interest and/or firm characteristics motivate managers' decisions on lobbying for or against recognition of various accounting events (see, e.g., Deakin, 1989; Schalow, 1995; Ang *et al.*, 2000), it is uncertain whether self-interest similarly motivates lobbying between choices of venue or formats of disclosure. Because disclosures do not affect net income (or other items possibly related to net income such as debt covenants or bonus plans), and annual proxy statements already report the SBC of the top five executives, one might expect management to be indifferent to lobbying on disclosures. However, firms in fact lobbied the FASB on the ED for FAS 123 in different manners: in opposition to any disclosure of SBC in the annual report, in favour of summary disclosure in footnotes, or in favour of pro forma income statement disclosure. Therefore, the question becomes what causes the differences in lobbying behaviour?

Economic self-interest is posited to explain the differences in lobbying on venue and format of disclosure of financial information as it has been found to explain differences in lobbying on recognition of financial information. Economic self-interest is measured in three ways: total amount of prior and current SBC held by the top five executives, total amount of current SBC held by all other employees, and the percentage decrease in pro forma net income due to recognition of employee SBC.[3] Managers will lobby against disclosing the amount of executive or total SBC in different venues and formats if they believe that stakeholders such as labour unions, shareholders or government regulators will react adversely to such disclosures. For example, disclosure of 'excessive' executive SBC may lead to demand from labour for higher wages or to demands from government for increased taxation and/or limitations on SBC.[4] Further, disclosure of information of the effect of executive and/or total SBC on pro forma net income may lead to labour or shareholder demands for reduced SBC if the reduction in net income seems excessive. Arguably, securities markets would react unfavourably to mandated higher wages for labour, increased taxation, or imposed limits on SBC.[5]

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[2] U.S. proxy statements must disclose only the top five executives' base salaries, bonuses, other cash compensation, stock appreciation rights, and information about options granted. The proxies also report the value of stock option grants valued at either a 5 per cent or 10 per cent expected growth rate or report the value using the Black–Scholes (1973) option-pricing model.

[3] Data are not available to calculate the value of the prior SBC of employees other than the top five.

[4] For example, the furore over 'excessive' executive compensation led to enactment of Section 162(m) of the U.S. Internal Revenue Code that disallows deductions for cash compensation of over $1,000,000.

Whether economic self-interest motivates management lobbying position on the venue of disclosure is examined by testing the following hypothesis:

H1: Economic self-interests are related to managers' lobbying on the venue of disclosure of SBC (proxy statement versus annual report).

It is expected that a negative relationship exists between the amount or share of executive SBC and willingness to disclose executive SBC in the annual report, the venue choice. Similarly, it is posited that the greater the amount of other employee SBC, the less likely it is that managers would wish to disclose this additional information in annual reports. Also posited is that those firms that would experience the biggest decreases in pro forma net income should be more likely to oppose disclosure.

Whether economic self-interest motivates managers' lobbying position on the format of disclosure is examined by testing the following hypothesis:

H2: Within the group that favours disclosure, economic self-interests are related to managers' lobbying on the format of disclosure of SBC (summary information versus pro forma net income statement information).

If economic self-interest motivates lobbying behaviour, then firms with greater levels of executive SBC and/or other employee SBC should be more likely to lobby against pro forma net income statement disclosure. Similarly, the greater the (negative) effect SBC has on pro forma net income, the more likely a firm should be to lobby against pro forma net income statement disclosure.

## METHOD AND RESEARCH DESIGN

To test those hypotheses, comment letters to the FASB on the ED for FAS 123 were examined.[6] The original population included 469 comment letters from industry. Thirty-three letters were excluded from representational organizations, as were 54 letters from firms which were not publicly traded, 85 letters from firms for which no proxy information was publicly available, 16 letters from firms for which no COMPUSTAT data were available, and 15 other comment letters from firms which were holding companies, Canadian-based firms, or firms not adequately identified by the comment letter. Each author independently coded the comment letters as either opposed to FAS 123, in favour of summary disclosure, or in favour of pro forma (or recognition in) income statements. Discussions about any conflicts resulted in unanimous agreement on all but four firms that were excluded from the sample. The final sample includes 262 comment letters from firms that responded to the 1993 ED.[7]

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[5] Commentators note that 'Stock options and the wealth that accompanies success in the new economy are widely regarded in Europe as immoral, unjust or just plain excessive' (Delaney and Wessel, 1999, p. A1). Other commentators note that the relatively higher use of stock options in the U.S. motivates managers to migrate to the U.S. (Ellison, 2000; Naik and Raghavan, 2000).

[6] Authorship of the comment letters is as follows: 78 per cent from one of the top five executives of the firm (chief executive officer, chairman, president, chief financial officer, or vice-president of finance), 17 per cent from individuals within finance departments (e.g., controller, treasurer, accounting manager), and 5 per cent by others in the firm (e.g., director government relations, director human resources, senior vice-president).

Firms were classified as opposed to FAS 123 when comment letters opposed *any* changes to the existing accounting for SBC as required by APB 25. For example, Lotus Corporation states that 'we urge the FASB to withdraw the ED and to retain the current accounting treatment for stock options'.

Firms were classified as in favour of pro forma income statements when they specifically referred to and supported the enhanced disclosure outlined in Appendix E of the ED. In general, Appendix E recommended disclosing stock option information such as grant and exercise price, term, number of options granted, as well as valuation of stock options and disclosure of pro forma income statements. For example, Zenith Electronics Corporation states that 'As an alternative to the proposed statement, the company would favor disclosure in lieu of recognition as presented in Appendix E of the Exposure Draft'.

Finally, firms were coded as lobbying for summary disclosure when they supported additional disclosures but did not specifically refer to Appendix E. Typically, such firms supported disclosing information similar to that required by the SEC in the proxy statements for the five most highly compensated employees concerning stock-based compensation but expanded to include *all* employees in the financial statements. For example, Sysco Corporation states that 'We would support . . . expanded disclosures regarding options such as those required under the [SEC] proxy rules'.

One hundred and forty-eight firms (56 per cent) opposed FAS 123 entirely and favoured no disclosure beyond that already mandated by APB 25 and the SEC. Eighty firms (31 per cent) disagreed with the recognition of stock options as compensation but supported summary footnote disclosure. Twenty-six firms stated they supported pro forma income statements. Finally, eight of the sample firms supported the recognition of stock-based compensation (FAS 123). For example, Lukens, Inc. states that 'We essentially support the theory and measurement methods proposed in the ED . . . financial reporting would be improved by the issuance of the proposed standard . . . [and] cannot find any compelling argument why compensation should not be recognized'. These eight firms were included with those twenty-six supporting pro forma income statement disclosure for a total of thirty-four firms (13 per cent of the sample).[8]

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[7] The sample included companies from all U.S. stock exchanges. We also examined the distribution of firms across industries (based on SIC code) and found no industry bias in the sample.

[8] It is assumed that firms that lobbied for disclosure preferred disclosure to the then current accounting for SBC under APB 25. However, it is possible that firms lobbied the FASB for disclosure not because they preferred disclosure but as a more palatable alternative than recognition of SBC. To test this, comparisons were made of opinions on the ED to FAS 123 before and after it became evident from widespread public criticism of the ED that the recognition of SBC was unlikely to happen. The U.S. business press was examined to determine when it became apparent that recognition

Since the FASB issued the exposure draft in 1993, data from 1993 COMPUSTAT and information from the 1994 proxies that detail each firm's executive compensation for 1993 were used. Instead of using only the value of current SBC granted to the top five executives (as followed in Dechow *et al.*, 1996), from the proxy statements data on the value of the unexercised stock options held by the top five employees was gathered. Including the value of unexercised stock options helps mitigate the possible confounding effects of using any one year's grant which may vary unsystematically and allows us to calculate total (current grants and prior holdings of) SBC for the top five executives.[9] The amount of current stock option grants for all other employees and the percentage decrease in pro forma net income was also measured.[10]

## RESULTS

Table 1 reports univariate statistics on 1993 stock option grants and unexercised options for the top five executives, other employee options, dollar decrease in pro forma net income, and sales. The average value of the 1993 stock option grants awarded to our sample firms' top five executives is approximately $4 million while the value of the unexercised options is about $14 million. Table 1 also shows the estimated dollar value of the 1993 options for all employees (on average $29.7 million) and the potential dollar decrease in pro forma net income (on average $11 million) due to the 1993 option grant. Finally, the table reports that median and mean firm sales are about $2 billion and $7 billion, respectively, which indicates that the firms responding to the ED were generally large firms.[11]

Remaining analyses, involved combining the current and prior stock-option grants and using the variable 'total SBC for the top five executives'. Table 2 reports the

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of SBC was unlikely. The *Wall Street Journal* reported five times on FAS 123 during the comment process: 6 April (Berton), 30 June, 5 November (Berton and Lublin), 23 December 1993 and 5 January 1994 (Berton). The 23 December article appears to give the clearest indication that passage of FAS 123 as proposed was unlikely. The article names such influential parties as President Clinton, the Council of Institutional Investors, and the Business Roundtable as being opposed to requiring recognition of SBC. We compared firm lobbying opinions pre and post the 23 December article and found no statistically significant difference between the percentages of firms that lobbied for disclosure before and after 23 December.

[9] Clearly different models may provide different reported values of current SBC. For example, the majority of our firms used the potential realizable value method while some used use the Black–Scholes (1973) option pricing model for valuing current option grants. However, firms do not use either the potential realizable value method or the Black–Scholes model to report the value of unexercised options (prior SBC) in the proxy. Proxy statements report the value of prior SBC as the year-end market price of the stock less the grant price of the options. The values of current and prior SBC, standardized by sales, are correlated at 0.76, $p \leq 0.0001$; therefore, we are not able to include both measures in multivariate analysis. Instead, there is recourse to the sum of the two measures in the analyses.

[10] The 1993 stock option grants for all other employees are extrapolated from the reported percentages and values of 1993 option grants to the top five executives. Then the entire 1993 option grant is expended over an assumed three-year vesting period.

[11] Median and mean 1993 sales for all firms in the COMPUSTAT database were approximately $246 million and $2 billion, respectively.

TABLE 1

INDEPENDENT VARIABLES UNIVARIATE STATISTICS

| Variable | Mean | Median | *SD* | Lower quartile | Upper quartile |
|---|---|---|---|---|---|
| Value of current options for top 5 executives[a] | $4,019,024 | $2,084,786 | 5,703,198 | $590,920 | $5,170,769 |
| Unexercised options for top 5 executives[b] | $14,020,458 | $5,260,219 | 39,238,929 | $1,471,778 | $15,008,272 |
| Total SBC for top 5 executives | $18,278,996 | $8,201,983 | 50,834,621 | $3,396,817 | $8,645,472 |
| Estimated value of options for other employees[c] | $29,697,644 | $8,783,858 | 64,965,527 | $1,390,137 | $28,041,977 |
| Dollar decrease in pro forma net income from recognition of all employee options[d] | $11,238,889 | $3,870,894 | 22,866,615 | $860,638 | $10,872,204 |
| Total firm sales | $7,270,594,000 | $2,328,642,000 | 14,608,780,000 | $463,567,000 | $8,287,500,000 |

*N* = 248

[a] Reported value in the proxy statements based on 5% growth or Black–Scholes Option Pricing Model.

[b] Reported value in the proxy statements less the current year's stock option grant.

[c] Calculated from reported value of options in the proxy statement for the top five executives and the reported percentage of total options granted.

[d] Assuming a three-year amortization period.

TABLE 2

DIFFERENCES IN STOCK-BASED COMPENSATION AND EFFECT ON PRO FORMA NET INCOME BY VENUE CHOICE

(*t*-tests of mean differences)

| Variables | Lobby for status quo proxy statement disclosure Mean (*SD*) | | Lobby for disclosure in annual report Mean (*SD*) |
|---|---|---|---|
| Total SBC for top 5 execs ÷ sales | 0.022<br>(0.032) | *** | 0.011<br>(0.022) |
| Other employee SBC ÷ sales | 0.012<br>(0.015) | *** | 0.007<br>(0.012) |
| % impact on pro forma net income from SBC for all employees | 0.296<br>(0.414) | n.s. | 0.221<br>(0.390) |
| | $n = 136$ | | $n = 108$ |

*** $p \le 0.01$, two-tailed test.
n.s. means are not significantly different.

mean values for the top five and other employee SBC (standardized by firm size) and the impact of recognizing SBC on pro forma net income by lobbying position on venue choice for the firms that lobbied for no disclosure (lobby for status quo: proxy statement disclosure) and firms that lobbied for either summary or pro forma disclosure in the annual report. Notice that the means for the value of total SBC for the top five and the value of other employee stock option grants are significantly higher for the group of firms that oppose any change in venue. In particular, the value of the total SBC for the managers that opposed a venue change are 50 per cent greater than the total SBC for the managers that support reporting SBC in a new venue.

Recall that proxy statements already provide information about the SBC of the top five executives. Therefore, the firms that lobbied for disclosure of SBC in the annual report would only provide incremental information on the other employee SBC. It is argued that firms that have little or no other employee SBC to disclose should be indifferent between the two venues as both venues would report essentially the same information. A test of whether it is the amount of personal wealth (SBC) that drives managers to oppose a change in reporting venue rather than unwillingness to disclose additional information in a new venue is to hold the additional information constant. It is found that even when other employee stock-based compensation is low or non-existent, the more personal wealth (SBC) managers have, the less likely they are to support a change in reporting venue.[12] This leads to the conjecture that a reluctance to disclose SBC in the financial statements

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[12] This analysis includes the thirty-one firms for which other employee SBC (standardized by firm size) is zero or nearly zero ($\le 0.001$) compared to a sample mean for other employee SBC of 0.01. The average SBC for the top executives is over three times as large for those opposed to change in venue versus those supporting summary disclosure in the annual report (0.0036 versus 0.0011, $p \le 0.05$).

TABLE 3

SUMMARY OF LOGISTIC REGRESSION MODEL

| Variables | Parameter estimate<br>(standard error) |
|---|---|
| Total SBC for top 5 execs + sales | −13.53***<br>(5.45) |
| % impact on pro forma net income from SBC for all employees | −0.22<br>(0.35) |
| Intercept | 0.05<br>(0.17) |
| Model $\chi^2$ | 294.13 |
| Degrees of freedom | 3 |
| $p$-value | 0.0003 |
| | $n = 228$ |

*** $p \leq 0.01$
Dependent variable = 0 for those who oppose FAS 123,
= 1 for those who support disclosure in Annual Report.

may be similar to a reluctance to disclose one's taxable income. Finally, Table 2 shows no significant difference in the impact of recognizing SBC on the pro forma net income between groups.[13]

In addition to univariate tests, a logit regression of total SBC for the top five and the effect on pro forma net income on lobbying position were performed. Table 3 reports that total SBC is significantly and negatively related ($p \leq 0.01$) to lobbying behaviour. That is, as SBC increases, it is more likely that firms will oppose a change in reporting venue. As in the univariate test, the effect on pro forma net income is not significant in the logit model. These results support the hypothesis:

H1: Economic self-interest as measured by SBC is related to venue choice.

Table 4 reports the mean values of total SBC for the top five, the SBC of other employee stock-based compensation, and the impact of recognizing SBC on pro forma net income by lobbying position on format within the group of firms that support disclosure in the annual report (a reduced sample). The mean value of total SBC of the top five is significantly higher ($p \leq 0.01$) for the group of firms that oppose presenting pro forma net income. We also find significant differences between groups for mean values of other employee stock-based compensation. These results indicate that the higher SBC is in general, the less likely firms are to lobby for pro forma disclosure of SBC. However, the impact of recognizing SBC on pro

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[13] The results reported use parametric statistics. Similar results are found using non-parametric statistics (a Wilcoxon signed rank test) for all variables except for the variable 'impact on pro forma net income'. The parametric test finds no significant difference in the 'impact on pro forma net income' between the firms that lobbied for or against disclosure. However, the non-parametric test does find a significant difference ($p < 0.01$).

TABLE 4

DIFFERENCES IN STOCK-BASED COMPENSATION AND EFFECT ON PRO FORMA NET INCOME BY CHOICE OF FORMAT DISCLOSURE IN THE ANNUAL REPORT

(*t*-tests of mean differences)

| Variables | Lobby for summary disclosure<br>Mean (*SD*) | | Lobby for pro forma net income disclosure<br>Mean (*SD*) |
|---|---|---|---|
| Total SBC for top 5 execs + sales | 0.013<br>(0.024) | *** | 0.003<br>(0.002) |
| Other employee SBC + sales | 0.008<br>(0.012) | ** | 0.004<br>(0.006) |
| % impact on pro forma net income from SBC for all employees | 0.218<br>(0.386) | n.s. | 0.229<br>(0.410) |
| | *n* = 76 | | *n* = 32 |

*** $p \leq 0.01$, two-tailed test.
** $p \leq 0.05$, two-tailed test.
n.s. means are not significantly different.

forma net income is not significant. While the univariate tests examine the variables of interest only in isolation, they provide some support for hypothesis 2:

H2: The value of SBC is significantly related to lobbying position on the format of disclosed information.[14]

## DISCUSSION AND CONCLUSION

Research on lobbying of the FASB has examined whether economic self-interests affect lobbying behaviour on recognition of various accounting transactions. Other research examines whether managers or users of financial statements perceive differences in recognized versus disclosed information. Also, research reports that, given a choice, managers choose models that report (in proxy statements) lower values of executive SBC. The present study extends prior research by examining whether economic self-interests are similarly related to managers' lobbying behaviour on venue and format choice for reporting accounting information. Firms lobbied on a variety of venues and formats for disclosure of stock-based compensation. Economic self-interest, as measured by stock-based compensation, is significantly related to lobbying positions on both venue and format. An especially intriguing result is that managers with relatively higher SBC are more reluctant than other managers to disclose information about their SBC in the annual report even when the proxy statement already discloses similar/identical information. This is evidence that managers view reporting information in proxies to be different than reporting that information in annual reports. However, there was no relationship between the effect on pro forma net income and opinions on the ED for FAS 123.[15] This may imply that using the effect on pro forma income of a particular disclosure may not always be the appropriate surrogate for the political costs resulting from that disclosure.

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[14] A logit model is used to analyse the effect of total SBC and pro forma net income on lobbying position on format, but the model is not significant. This may be due to the small sample sizes (see Table 6, *n* = 76 versus *n* = 32) of the two groups of firms that support different formats of disclosure within the annual report. As sample sizes decrease, the power (the ability to find a significant result) decreases (Henkel, 1976).

In related research, Dechow *et al.* (1996) examine whether executives lobby against recognition of information on SBC. They find no evidence that the market reacted to the ED on FAS 123. They surmise that executives lobbied against recognizing SBC not to avoid the negative effect on cost of capital of expensing SBC, but, rather, to avoid public scrutiny of executive compensation. Since proposed recognition of SBC had no effect on stock prices, then neither should proposed disclosure of that same information (the focus of this study). Yet, managers lobbied against disclosure of SBC in the annual reports even in the cases where the firm granted all the SBC to the top five executives which means that virtually all information is already reported in proxy statements. This, we argue, is evidence that managers lobby on the venue of disclosure (H1). We argue, following Dechow *et al.* (1996), that in the case of SBC, fear of public reaction of users of annual reports (e.g., from labour unions or government regulators) motivates lobbying behaviour. That is, disclosure of the SBC of the top five (and other executives in the aggregate) may lead to public demands for changes in compensation packages (e.g., reduced use or higher taxation of SBC), which in turn may lead to lower stock prices.

As noted above, examining the substance of comment letters rather than merely the direction of the lobbying provides a richer explanation of managerial motives. Evidence was adduced that in other lobbying situations managers care whether and how information is disclosed even when that disclosure has no effect on reported income. For example, many comment letters on the ED for FAS 106 (*Other Postemployment Benefits*) argued for or against the disclosure of other postemployment benefits on grounds other than the effect on net income. For example, Campbell Soup Company (15 August 1989) argues that the act of disclosing the (revocable) obligation for other postemployment benefits would cause users of financial statements to perceive erroneously that the obligation was a legally binding irrevocable liability, that is, 'employers should not be forced by an accounting standard to promise a benefit they do not admit'. In contrast, American Standard Inc. (6 September 1989) argues for disclosure of OPEB as a means 'to intensify the focus of our managers on an important element of cost'.

Limitations of the study include the relatively small sample size of the two groups favouring disclosure in the annual report which limits the power of logistical analysis of between-group differences on this dimension. Thus, the analysis for the sub-sample is limited to univariate statistics. Also, lack of publicly available information necessitated extrapolating some values such as the value for other employee stock-based compensation.

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[15] Prior research by Dechow *et al.* (1996) on lobbying and non-lobbying firms on FAS 123 finds that, in general, managers of lobbying firms have higher levels of total compensation and receive a greater portion of their total compensation in stock options. This may imply that even though we find no difference in effect on net income within the group that lobbied, there may be a difference in the effect on net income for lobbying relative to non-lobbying firms.

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# APPENDIX

## FAS 123 VERSUS APB 25: ACCOUNTING FOR STOCK-BASED COMPENSATION

Essentially, two types of stock option plans exist: fixed and variable plans.[16] In fixed plans (e.g., incentive stock options), the option price at date of grant is set equal to (or sometimes greater than) the fair market value (FMV) of the stock at the date of grant. Prior to the issuance of FAS 123, APB 25 governed the disclosures of stock-based compensation. As of 15 December 1995, firms may choose to follow FAS 123. The crucial distinction between FAS 123 and APB 25 is the measurement of total stock-based compensation expense. Under APB 25, *no* compensation expense is recorded for fixed plans (the most prevalent type of stock option plan), and compensation expense for variable plans is measured only as the difference between the option price and the stock price.[17] Under FAS 123, total compensation expense is measured as the fair value of the options (as derived from an option-pricing model) regardless of whether the option plan is fixed or variable. The amount of compensation expense due to stock options reported in annual income statements will vary significantly under the two accounting methods. Further, following FAS 123, net income decreases significantly in some cases.[18]

In contrast to APB 25, FAS 123 mandates extensive disclosure of stock-based compensation in annual reports in part to bring the reporting requirements between the annual reports and the proxy statements closer together. Adopting FAS 123 ensures that firms providing stock options will recognize some compensation expense whether the option plan is variable or fixed. This is a significant change from APB 25. FAS 123 requires use of an option-pricing model that considers six factors in measuring the value of a stock option: (a) current price of the stock, (b) exercise price of the option, (c) option life (maturity and vesting period), (d) expected volatility of the stock, (e) expected dividends on the stock, and (f) a risk-free interest rate.

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[16] Matsunaga (1995) and Coopers and Lybrand (1993) report that the vast majority of stock option plans are fixed, that is, the option price is set equal to the fair market value at the date of grant.

[17] For example, a firm granting an option to buy stock at $100 when the FMV of the stock was also $100 has a fixed plan and would measure compensation expense as $0 because no difference exists between the option price and the FMV of the stock. In contrast, a firm granting an option to buy stock at $80 when the stock is worth $100 has a variable plan and would measure total stock-based compensation as $20 (the difference between the option price and the FMV).

[18] See Coopers and Lybrand (1993) for a discussion of the possible effects on income of following FAS 123 versus APB 25. Coopers and Lybrand's 1993 field study of the effect of adoption of FAS 123 states that emerging firms would suffer a greater decrease in net income than mature companies.

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# A Possible Economic Rationale for Straight-Line Depreciation

Straight-line depreciation (SL) appears to be a crude procedure that is unsupported by economic logic. Nevertheless, internationally, it is the most widely used method of allocating the costs of fixed assets to accounting periods by way of depreciation charges. Many authors attribute its use to its simplicity. That justification may be deemed to be insufficient, since ideally SL should provide accounting figures with economic meaning under known assumptions. Such meaning might be defined by reference to the net present value (NPV) calculus, which is recommended in the literature of financial management for the evaluation of economic flows associated with the acquisition of fixed assets. After briefly considering economic depreciation alternatives discussed in the literature, this article selects the Ladelle/Brief/Grinyer Earned Economic Income (EEI) calculus as a theoretical model for the examination of SL depreciation. EEI provides signals which are consistent with those given by NPV and can satisfy the accounting constraint that one should recognize realised profits only. The article employs mathematics and deterministic computer simulation to explore some circumstances in which SL provides figures which approximate to the net investment charges using the EEI calculus. It shows that there are many patterns of declining annual benefits from ownership for which SL provides an approximation to EEI net charges that could be considered to be adequate. Consequently SL often provides more economically interpretable information, and consequently is more defensible, than is typically assumed in the literature relating to accounting.

**Key words:** Earned economic income; Economic rationale; Depreciation; NPV; Straight-line.

Figures of accounting earnings are used for a variety of institutional and contractual purposes. For example, both company law and loan contracts may limit dividend distributions by reference to reported earnings (see Smith and Warner, 1979), and managerial incentive schemes are frequently based on such figures. In addition, empirical studies suggest that share price changes are positively associated with both the size and direction of changes in unexpected reported earnings.[1] This

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[1] See, for example, Watts and Zimmerman (1986, p. 69) for a summary of some of the evidence in the U.S.A.

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could imply that investors, shareholders and legislators believe that figures of reported earnings convey relevant economic information. The emphasis placed by managers on reported earnings[2] is consistent with a similar belief being held by them. Yet such beliefs may be unfounded if apparently arbitrary, but material, depreciation figures are being used in the calculation of earnings. Clearly, it is desirable that depreciation figures convey economic information under defined assumptions.

Internationally, the most widely used method of calculating depreciation is the 'straight-line' (SL) method (see Gray *et al.*, 1984, pp. 44, 99). Despite its dominance, there is at present no stated basis on which SL can be supported by reference to the economic meaning of its outputs. Indeed, Hendriksen and Van Breda (1992, p. 547) recommend its use merely because it is the 'simplest depreciation model'. The fact that an economic rationale for SL has not so far been established represents a major difficulty in the justification of the approach, because it means that the method is not 'defensible' (Thomas, 1969, 1974). It is, however, possible that SL provides economic information that is adequate within the highly uncertain environment of practice. That could occur if it is an adequate proxy for an alternative depreciation approach which explicitly provides information with a defined economic meaning. This article explores such a possibility by reference to a class of matching based theoretical models that produce net income figures which are related to the financial management concept of net present value (NPV), and consequently can be interpreted as conveying economic information (see, e.g., Copeland and Weston, 1988). It identifies by mathematical and simulation analyses that there are many definable combinations of patterns of declining benefits, asset lives and interest rates for which SL could be deemed to be an adequate proxy for the theoretical model. Therefore it defines some of the circumstances in which SL can be defended by reference to economic logic.

## THE THEORETICAL MODEL

Textbooks on accounting theory typically outline two primary methods of depreciation that are founded on economic concepts. The first defines depreciation by reference to changes in the present value (PV) of the future cash values of benefits to be derived from ownership of the asset concerned (see, e.g., Hendriksen, 1982, p. 374). The second method defines depreciation by reference to the internal rate of return concept, which uses the same calculations as the first approach, except that the cost of capital variable is replaced by the internal rate of return (see, e.g., Hendriksen, 1982, p. 376). It has for long been recognized that the present value approach, which equates to a version of Hicks' (1946) economic income, recognizes unrealized gains in the calculation of profit (see Shwayder, 1969; Barton, 1974; Bromwich and Walker, 1998). Because it uses the same basic calculus, the IRR method similarly can credit a period with unrealized gains which are attributable to future expected benefits.[3] Yet current statute law in many countries, and accruals accounting which underlies practice, are based on the concept that profits should not be recognized until they are 'realized'. That constraint has led to the definition of depreciation as a process which: 'aims to distribute the cost or other basic value of tangible capital assets . . . over the estimated useful life of the unit . . . in a systematic and rational manner. It is a process of allocation, not of valuation' (AICPA, 1955, p. 100). As indicated in the AAA Statement of Accounting Theory and Theory Acceptance (AAA, 1977), the stated definition lacks guidance on the meaning of 'rational' which 'has enabled accountants to defend widely varying time patterns of depreciation'. Arguably the term rational should relate to the provision of information with defined economic meaning, but the acceptance of the realization constraint would imply that the 'economic' depreciation methods of PV and IRR are not acceptable in practice.

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[2] See, for example, Grinyer *et al.* (1994).

Following from the above, one might reason that an ideal theoretical model would: (a) be consistent with NPV and therefore with the economic reasoning that underlies the 'economic depreciation' models outlined above; but (b) not take credit during the accounting period for unrealized gains. The depreciation approach introduced by Ladelle (1890) and rediscovered by Brief (1967) is such a model. Yet Ladelle and Brief did not connect the model to NPV. That relationship was established in Grinyer (1985), where an equivalent and independently derived model based on NPV considerations was presented. For ease of presentation, the Ladelle/Brief/Grinyer model will, in this article, be referred to by the name 'earned economic income' (EEI) used by Grinyer and by Bromwich and Walker (1998) to identify the approach. Recently Rogerson (1997) presented an agency theory based analysis that argued for the adoption of a model that is mathematically equivalent to EEI for the measurement of earnings as a basis for managerial compensation. Consequently it appears that the model has received independent support from a number of authors. This article uses EEI as a theoretical basis for an economic depreciation approach and examines the extent to which SL depreciation could act as an adequate surrogate for EEI depreciation. It seeks to identify the patterns of flow of benefit, if any, under which SL could be assigned economic meaning by reference to the thinking that underlies EEI. (The APB statement 1 on Accounting Principles [AICPA, 1972, p. 4] noted that rational allocation 'always involves assumptions about the pattern of benefits'.)

It should be noted that, in common with the IRR approach, EEI depreciation assumes the independence of individual fixed assets (see, e.g., Peasnell, 1995a, 1995b; Grinyer, 1995). This article adopts that assumption, which is also implicit in the earlier work by Anton (1956) which explored the adequacy of SL as a proxy for economic depreciation. Anton developed his analysis under assumptions of certainty in which the cost of capital equalled the IRR and the present value of the investment equalled its cost. Under those assumptions he presented some arithmetic examples and plotted the related patterns of benefits from ownership and of 'economic' depreciation. He identified that, in some circumstances, declining patterns of annual benefit gave rise to equivalence between SL and 'economic' depreciation. It is important to note that under Anton's assumptions there were no unrealized profits—for 'revenues' always exactly equalled the sum of depreciation and the interest cost on the depreciated investment, the NPV was zero and the IRR equalled the cost of capital.

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[3] This can be illustrated by reference to the situation in which an accounting period has no benefits from an asset but the internal rate of return for the asset exceeds the cost of capital. In these circumstances the IRR calculus will credit the period with the IRR on the opening asset value, with a compensating debit to the asset account. Thus the accounting report for the period recognizes an unrealized gain from the asset, resulting from the excess of the IRR over the cost of capital.

The analysis of this article differs from Anton's because it:

1. relaxes Anton's assumptions, so that equivalence of (a) investment and PV and (b) of cost of capital and IRR are not required;
2. consequent on (1), permits the generation of non-zero NPV, so that unrealized profits may exist;
3. establishes formal criteria of adequacy by which to judge proxies that do not provide exact equivalence to theoretical models of depreciation, applied in this instance to the adequacy of SL as a surrogate for EEI depreciation; and
4. uses simulations to cover a much fuller range of patterns of annual benefit and to calculate differences between the SL and 'economic' depreciation figures.

## COMPARISON OF SL AND EEI DEPRECIATION

The details of the calculation of EEI figures are given in Appendix 1. It is shown there that $EEI_p$ represents the net wealth created by the investment $I$ during the accounting period $p$. It shows the interest adjusted portion of the NPV which can be attributed to the cash value $C_p$ of the benefits relating to that period. As indicated above, EEI reports only 'realized' income and does not incorporate income arising from gains that are attributed to future periods. In this respect it differs fundamentally from NPV and IRR variants of economic income. As explained in Appendix 1, equations (1) and (2) provide the basic formulation, as follows:

$$EEI_p = C_p - \frac{C_p}{Z} \tag{1}$$

where

$$Z = \frac{\sum_{t=1}^{N} C_t(1+i)^{-t}}{I} \tag{2}$$

with $i$ the appropriate rate of interest, and $N$ the number of periods for which the invested asset is in use. From equation (1) it is seen that the *gross* EEI depreciation is given by $C_p/Z$. However, since EEI is a form of economic income it is necessary to take account of the interest adjustment when computing the *net* depreciation to be deducted from the book value, reflecting a reduction in equity capital. (The accounting approach is similar to that for the well known 'annuity' depreciation method.) This can be formally shown as follows: let $B_p$ denote the book value of the asset at the close of period $p$, so that $B_0 = I$. Then

$$B_p = B_{p-1} - \frac{C_p}{Z} + i \cdot B_{p-1} \tag{3}$$

where the last term is the interest credit adjustment. It follows that the net depreciation charge $E_p$ for the period $p$ is given by

$$E_p = B_{p-1} - B_p = \frac{C_p}{Z} - i \cdot B_{p-1} \tag{4}$$

for $p = 1, 2, \ldots, N$. It is not difficult to derive the recurrence relation for $E_p$ as

$$E_{p+1} = (1 + i)E_p + \frac{(C_{p+1} - C_p)}{Z} \tag{5}$$

with the initial condition

$$E_1 = \frac{C_1}{Z} - iI \tag{6}$$

Interest adjustments made in calculating net EEI depreciation cancel in total over the lifetime of the asset, so that

$$\sum_{p=1}^{N} E_p = I \tag{7}$$

In what follows the main interest will be focused upon the differences between the EEI depreciation figures and those from SL depreciation, namely $I/N$. It is therefore convenient to define the proportional difference, $PD_p$, between these values by

$$PD_p = \frac{\left(E_p - \dfrac{I}{N}\right)}{\dfrac{I}{N}} \tag{8}$$

One should not expect that the $\{E_p\}$ pattern would exactly match the constant charges given by SL depreciation, given that the latter are not derived on the basis of an equivalent theoretical rationale. There is, however, the possibility that SL provides an adequate approximation to the EEI charge patterns. As discussed in the next section, the concept of adequacy is necessarily subjective and may be made operational in a number of ways which should be assessed by reference to their practical implications. These ideas can be explored with the aid of a deeper analysis of the general properties of the $\{E_p\}$ pattern. That pattern is determined firstly by that of benefits pattern $\{C_p\}$, and secondly by the parameters $I$, $i$ and $N$, as can be seen from equation (5).

It is useful to note that in the case of constant benefits, that is, $C_p \equiv C_1$, then equation (5) reduces to

$$E_{p+1} = (1 + i)E_p \tag{9}$$

a recurrence which defines a geometric progression (GP), given by

$$E_p = (1 + i)^{p-1}E_1 \tag{10}$$

In general, the effect of introducing $\{C_p\}$ that differ from a pattern of constant values of benefits is to perturb or distort what might be regarded as the basic underlying form of the $\{E_p\}$ pattern.

There is, however, a uniquely defined pattern $\{C_p^*\}$ which gives rise to an EEI charge schedule $\{E_p^*\}$ that is identical to the SL schedule. For this to happen, $E_p^*$ must be constant and equal to $I/N$. From equations (5) and (6), with $E_p \equiv I/N$, we find that the first difference $C_{p+1}^* - C_p^*$ is also constant, so that

$$\Delta C_p^* = C_{p+1}^* - C_p^* = -iZ\frac{I}{N} \tag{11}$$

It follows that the pattern $\{C_p^*\}$ has the special form of an arithmetic progression (AP), with step size $S^* = C_{p+1}^* - C_p^*$. The elimination of $Z$ from equations (5) and (6) yields the expression

$$S^* = -C_1\frac{i}{(1 + Ni)} \tag{12}$$

This is an important result. For every interest rate $i$ and duration $N$ there exists a unique $\{C_p\}$ pattern, in the form of an AP with negative steps, that provides an *exact* match between the SL depreciation schedule and that obtained by using the net EEI charges. It is noticeable that the step size $S^*$ appears as a fraction of the initial benefit $C_1$ and is independent of $I$, the initial investment. In much of what follows the *relative step size* $K = S/C_1$ is used instead of $S$. Thus equation (12) can be taken as defining the critical value of $K$ for which an exact match is obtained, namely

$$K^* = \frac{-i}{(1 + Ni)} \tag{13}$$

Equation (13) suggests that it may be those patterns of benefits which are of the form of an arithmetic progression that provide the best approximations to the SL depreciation profile. Consideration of the general form

$$C_p = C_1 + (p - 1)S \tag{14}$$

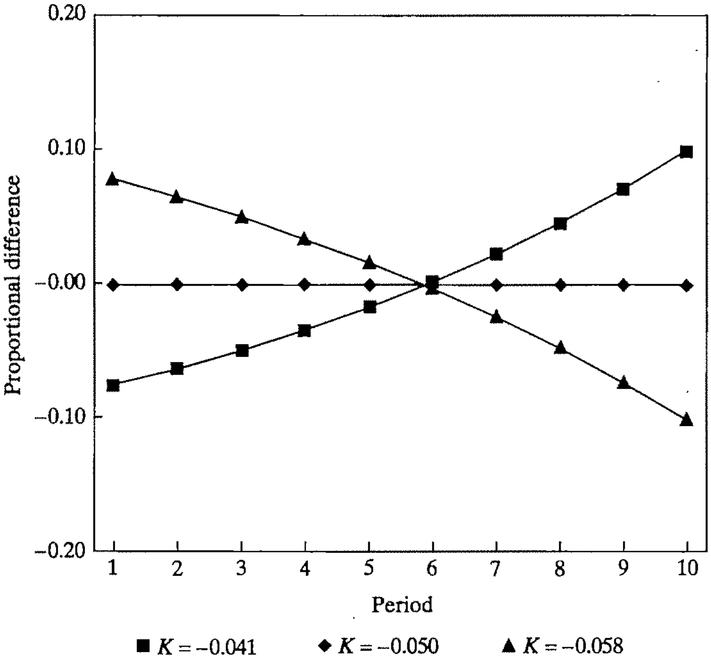
leads to the corresponding version of the recurrence relation (5), namely

$$E_{p+1} = (1 + i)E_p + \frac{S}{Z} \tag{15}$$

Regarded as a perturbation on the underlying GP pattern of equation (10), the term $S/Z$ will tend to progressively enhance the growth of $E_p$ with increasing $p$ if $S > 0$, while if $S < 0$ it will induce a correspondingly declining pattern. Figure 1

FIGURE 1

EEI AND SL DEPRECIATION COMPARED (AP PATTERNS)



$K$ = Relative step size; Interest rate $i = 0.1$;
PD is defined in equation (8)

illustrates the EEI depreciation charges for three different AP patterns of benefits in terms of the proportional difference $PD_p$ from the SL depreciation, as defined in equation (8). In the figures $I = 10{,}000$, $i = 0.1$, $N = 10$ and $C_1 = \$1{,}000$. One of the benefit patterns in Figure 1 has a step size equal to the critical value $K^* = -0.05$, as calculated from equation (13); the corresponding proportional differences from the SL depreciation schedule are therefore zero (i.e., there is an exact match between SL and EEI depreciation). The figure demonstrates quite clearly the way in which the profile of $\{E_p\}$ changes as $K$ varies around the critical value of $K^*$. In fact, it can be shown analytically (see Appendix 2) that for $K > K^*$ not only is the sequence $\{E_p\}$ monotonically increasing, but the rate of change of increase is positive also, while the exact converse holds for patterns defined by ratios $K$ that are less than $K^*$.

## CRITERIA FOR ADEQUACY

The subsequent analysis examines the adequacy of SL as a proxy for EEI depreciation charges using two criteria to measure goodness-of-fit. The first is the mean absolute error (see, e.g., Makridakias *et al.*, 1983, p. 44) and involves the average of the annual monetary differences between the figures provided by SL and EEI, taken over the life of the asset. This is called the 'monetary criterion', and emphasizes the long-term behaviour of the proxy. However, the averaging process could conceal the existence of periods with unacceptably high and hence material deviations from the 'ideal'. Consequently a periodic measure, called the 'materiality criterion', is also developed and used in the subsequent analysis. This uses the absolute proportional difference $|PD_p|$ and takes account of every period for which this is material. Consequently it is more rigorous than the standard 'monetary' (mean absolute difference) criterion, and possibly more applicable to this accounting application.

Reference to Figure 1 shows that the values of $E_p$ are not always close to the SL value of $I/N$, although the fact that the average of the $E_p$ is identical to $I/N$ (see equation (7)) means that the two sequences must be related to some degree. There are a number of possible measures of difference, and perhaps the most familiar are the square, and the not dissimilar absolute difference. Since the latter allows for direct comparisons of monetary figures and also can measure periodic materiality, it is used in the simulations as described in the following section. Using the above 'monetary' concept, a straight line schedule could be said to provide an adequate proxy for the EEI scheme if the mean of the $N$ absolute differences between the $E_p$ and $I/N$ is less than some subjectively determined proportion of $I/N$, for example, 0.05 or 0.10. This measure of adequacy defines the 'monetary' criterion.

In contrast the 'materiality' approach uses a local measure of acceptability. The latter is expressed as a requirement that the absolute difference in any period, as a proportion of the SL depreciation figure, should not exceed a specified limit. Therefore it requires that periodic deviations should not be regarded as being material. The criterion is then based upon a count of the number of periods for which this condition is met. In the following analysis adequacy is defined under this criterion as requiring that *none* of the periodic differences is material. Figure 1 illustrates the concept, and shows 'acceptance levels' extending to ±0.10 of the SL depreciation figure. For a specific $\{E_p\}$ pattern any points falling within these levels would be counted as acceptable. By way of example, the extreme patterns that produce a 100 per cent success rate are shown. These patterns correspond to the situations where

$$E_N = (1 \pm 0.1)\frac{I}{N} \tag{16}$$

The consequent values for $K$ are $-0.05817$ and $-0.04117$, and the corresponding EEI depreciation schedules are shown in Figure 1. Appendix 2 provides both the proof that such patterns are optimal with respect to the criterion, and the derivation of the formula used to calculate the $K$ values.

The AP class of patterns of benefits was selected for mathematical investigation largely because the form specified by equation (11) is of this type. There are, however, arguments that would indicate that patterns of benefits associated with fixed assets might sometimes be better approximated by geometric progressions. For example, changes in specific prices in an inflationary environment could be better modelled in this way. This section therefore concludes by discussing the general geometric cash flow pattern of the form

$$C_p = (1 + g)^{p-1} C_1 \tag{17}$$

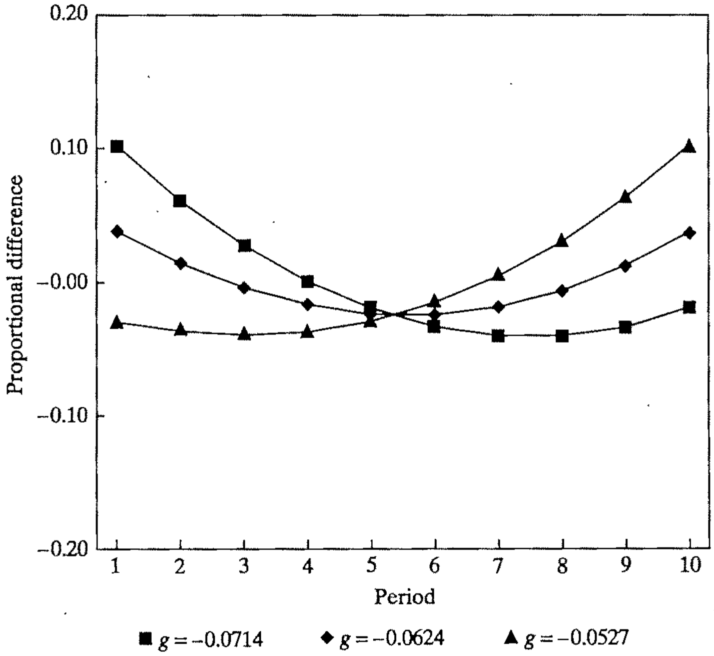
where $g$ is the growth rate. The recurrence relation for $\{E_p\}$ is then

$$E_{p+1} = (1 + i)E_p + g(1 + g)^{p-1} \frac{C_1}{Z} \tag{18}$$

Again, $\{E_p\}$ can be regarded as a perturbed version of a pure GP, but one where the perturbation term is more complex than before. It is clear, however, that there must be a sharp distinction between the cases of $g > 0$ and $g < 0$, since only in the latter case will the perturbation act so as to increasingly moderate the rate of change in $E_p$. Figure 2 shows the schedules of net EEI charges associated with three different GP patterns of benefit, the values of $I$, $i$, $N$ and $C_1$ being the same as were used for the earlier Figure 1. In this situation there is no value of $g$ that gives rise to an exact match between the SL and EEI charge schedules, but there is something like an optimally adequate value for $g$. This can be seen by observing that the $\{E_p\}$ has a unique minimum, even although this may not occur within the range $p = 1$ to $N$. When this minimum occurs near the midpoint of that range, at $p = \frac{1}{2} N$ say, the values of $E_p$ will cluster quite closely around the values $I/N$. In

FIGURE 2

EEI AND SL DEPRECIATION COMPARED (GP PATTERNS)



$g$ = growth rate; Interest rate $i = 0.1$;
PD is defined in equation (8)

Appendix 2 it is shown that such a condition is satisfied when $g$ is a solution of the equation

$$\left(\frac{g}{i}\right)^2 = \left(\frac{1+g}{1+i}\right)^{\frac{1}{2}N+1} \tag{19}$$

Figure 2 illustrates the solution for $N = 10$ and $i = 0.1$, namely $g = -0.0624$, and shows the ±0.10 acceptance levels as in Figure 1. The fit is clearly a good one in this case, and is adequate according to the materiality criterion. In general there is a range of values of $g$ which will provide adequate proxies by reference to defined acceptance limits. The extreme members within these particular acceptance levels are shown in Figure 2. They correspond to growth rates of −0.05262 and −0.07141, and the difference between these extreme values defines the 'adequacy band' discussed in the next section.

## THE SIMULATION MODEL

The mathematical analysis has focused on certain properties relating to goodness-of-fit. It has produced some useful insights and has led to two criteria of the adequacy of a proxy. Nevertheless, we cannot analyse the relationships between SL and EEI depreciation further using formal mathematics due to the well known intractability of expressions involving discounted cash flows. The technique of employing continuous approximations is not an appropriate one in this case, since the discrete periodic nature of the depreciation process is essential to the consideration of the adequacy of a proxy. Therefore simulation techniques have been used to explore more fully the relationships between the asset life ($N$), the interest rate ($i$), the benefit pattern $\{C_p\}$, and the difference between the $\{E_p\}$ depreciation schedule and the SL values. The simulation model was based upon the computation of the measures used for the two adequacy criteria, namely the average proportional absolute difference between $E_p$ and SL (APAD) and the count of periods yielding differences that are not judged to be material (COUNT). These are defined as follows for AP benefit patterns characterized by the relative step size ($K$). The absolute difference for period $p$ expressed as a proportion of the SL value is given by

$$PAD_p(N,i,K) = \frac{\left|E_p - \frac{I}{N}\right|}{\frac{I}{N}} \tag{20}$$

(Compare the signed difference $PD_p$ defined in equation (8)). APAD is the average of this difference taken over the asset's lifetime, so that

$$APAD(N,i,K) = \frac{1}{N}\sum_{p=1}^{N} PAD_p(N,i,K) \tag{21}$$

The monetary criterion is satisfied if APAD does not exceed some specified acceptability limit. For the materiality criterion it is convenient to define the discriminant function $X_p$ such that

$$X_p(N,i,K) = 1 \quad \text{if} \quad PAD_p(N,i,K) \leq a, \quad \text{otherwise} = 0 \tag{22}$$

where $a$ is the acceptability limit. Then the measure for the materiality criterion is

$$COUNT(N,i,K) = \sum_{p=1}^{N} X_p(N,i,K) \tag{23}$$

In the case of geometric patterns, the relative step size $K$ is replaced by the growth rate $g$ throughout.

The model was run using an initial investment of $10,000 and the initial benefit $C_1$ was arbitrarily assigned the value of the initial investment divided by the asset life. Simulations were carried out with asset lives of five, ten, fifteen and twenty years, which are typical of those found in accounting practice. Rates of interest were varied in steps of 2 per cent up to 14 per cent, relative step sizes (for AP patterns) and annual growth rates (for GP patterns) from –10% to +10%. The recurrence equations (5) and (6) were used to compute $\{E_p\}$ on a spreadsheet. Tables of $APAD(N,i,K)$, $COUNT(N,i,K)$, $APAD(N,i,g)$ and $COUNT(N,i,g)$ were drawn up for each of the specified values of $N$. Those that refer to an asset life of ten years are reproduced here as Tables 1 through 4, for illustrative purposes.

TABLE 1

MONETARY CRITERION—ARITHMETIC PROGRESSION

(APAD with ten-year life)

| | | Interest rate % | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 |
| Relative step size % | 10 | 0.17 | 0.24 | 0.31 | 0.38 | 0.45 | 0.51 | 0.58 | 0.64 |
| | 8 | 0.15 | 0.21 | 0.28 | 0.34 | 0.41 | 0.47 | 0.53 | 0.59 |
| | 6 | 0.12 | 0.18 | 0.24 | 0.30 | 0.36 | 0.42 | 0.48 | 0.53 |
| | 4 | 0.08 | 0.14 | 0.20 | 0.26 | 0.31 | 0.37 | 0.42 | 0.47 |
| | 2 | 0.05 | 0.10 | 0.15 | 0.21 | 0.26 | 0.30 | 0.35 | 0.40 |
| | 0 | 0.00 | 0.05 | 0.10 | 0.14 | 0.19 | 0.23 | 0.28 | 0.32 |
| | –2 | 0.05 | 0.01 | 0.03 | 0.07 | 0.11 | 0.15 | 0.19 | 0.22 |
| | –4 | 0.12 | 0.08 | 0.05 | 0.01 | 0.02 | 0.05 | 0.09 | 0.12 |
| | –6 | 0.21 | 0.17 | 0.14 | 0.11 | 0.09 | 0.06 | 0.04 | 0.01 |
| | –8 | 0.31 | 0.29 | 0.26 | 0.24 | 0.22 | 0.20 | 0.18 | 0.16 |
| | –10 | 0.45 | 0.44 | 0.42 | 0.40 | 0.39 | 0.37 | 0.36 | 0.35 |

*Note*: Relative step size = Annual change in cash flow / Cash flow in year 1.
APAD = Average proportionate absolute difference (see equation (21)).

Table 1 lists values of APAD (i.e., the average percentage absolute difference) for the range of AP benefit patterns defined by relative step sizes decreasing from +10% down to –10%. The smaller the magnitude of APAD in any cell the more adequate is SL as a proxy for EEI charges according to the monetary criterion. It is notable that, for each column (specified interest rate) the APAD magnitudes decline to a minimum and then increase again as $K$ assumes more negative values. This behaviour is consistent with equation (13) which gives the unique, and negative, critical value $K^*$ of the relative step size for which the SL depreciation is an exact match to the EEI schedule. At this point $APAD(N,i,K^*) = 0$. By looking along the rows of the table the general behaviour of APAD for fixed $N$ and $K$ but varying $i$ may be identified. For non-negative $K$ there is no possibility of an exact match, and APAD increases steadily with increasing $i$. Reference to equation (13) provides the assurance that for any negative $K$ there will be a critical value $K^*$ for any specified interest rate $i$. This is illustrated in Table 1, in which the APAD values show a decrease to a minimum as $i$ increases, followed by a steady increase. The locus of the minimum APAD values has the shape of a near-hyperbola, starting at $K = 0$ and $i = 0$, and declining to an asymptote at $K = -0.11$, which is the limiting case if all benefits are to be non-negative, for $N = 10$ (the condition $C_p \geq 0$ implies that $K \geq -1/(N-1)$, from equation (14)). As the monetary criterion is set in terms of an acceptance level $a$, adequacy is assumed whenever APAD does not exceed this limit. The stepped solid lines shown in the table indicate the upper and lower boundaries of the region of pairs of values $(K,i)$ for which $APAD(K,i) \leq 0.10$, corresponding to an acceptance level of 10 per cent. The boundaries roughly follow the shape of the locus of minima discussed above. The depth of the region gives an idea of the robustness of the SL proxy with respect to a variation in the step size of the AP pattern of benefits. For each column the difference between greatest and least values of $K$ that are contained in the region is therefore referred to as the 'adequacy range'. Characteristically, the adequacy range decreases as the interest rate $i$ increases.

This 10 per cent acceptance level represents a relatively rigorous criterion in the real world of uncertainty. It establishes a value of acceptable difference at 1 per cent of the initial outlay on the asset. Arguably, estimates of benefits from ownership of the fixed assets, required for the matching process, would rarely fall within that level of accuracy. If we were to assign an acceptable level of absolute difference at 2 per cent of the initial capital cost of the asset being depreciated the acceptance level would be 0.2. The broken stepped lines in Table 1 show the limits of adequacy under the relaxed condition. As the relative step sizes in the arithmetic progression are shown in 2 per cent intervals, the adequacy ranges as indicated will often be understatements of the precise figures (see Figures 3–6 later), but are sufficient to illustrate the general relationships. On the basis of the APAD (monetary) criterion, and using the more realistic 0.2 level of acceptance, one can observe that at rates of interest up to 12 per cent per annum there is range of *at least* 6 per cent of relative step sizes that generate acceptable outcomes. One can reasonably claim that such a range provides clear support for regarding SL as a proxy for EEI depreciation, if the average percentage absolute difference is the preferred criterion

TABLE 2

MATERIALITY CRITERION—ARITHMETIC PROGRESSION
(COUNT with ten-year life)

| | | Interest rate % | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 |
| Relative step size % | 10 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| | 8 | 4 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| | 6 | 4 | 2 | 2 | 2 | 1 | 1 | 1 | 1 |
| | 4 | 6 | 4 | 2 | 2 | 1 | 1 | 1 | 1 |
| | 2 | 10 | 5 | 4 | 2 | 2 | 1 | 1 | 1 |
| | 0 | 10 | 10 | 6 | 4 | 3 | 2 | 1 | 1 |
| | –2 | 10 | 10 | 10 | 7 | 4 | 3 | 3 | 3 |
| | –4 | 4 | 6 | 10 | 10 | 10 | 9 | 6 | 4 |
| | –6 | 2 | 2 | 4 | 4 | 6 | 9 | 10 | 10 |
| | –8 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 |
| | –10 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

*Note*: Relative step size = Annual change in cash flow / Cash flow in year 1.
COUNT = Number of periods with absolute differences that do not exceed 10% of the SL depreciation figure (see equation (23)).

of adequacy. As discussed above, one might wish to consider independently the potential scale of error in any reporting year. That possibility is addressed by the more demanding 'materiality criterion'.

Table 2 follows the materiality criterion by showing values of COUNT for the same ranges of $K$ and $i$. An acceptance limit of 10 per cent was used, so that the region defined by the stepped lines within which COUNT has the (maximum) value of 10 corresponds to adequacy under the materiality criterion. Since COUNT = 10 whenever the match is an exact one, the remarks made above relative to Table 1 are generally valid for Table 2 also. It is, however, noticeable that the materiality criterion tends to be more restrictive than the monetary one so that the adequacy ranges are generally smaller for the same interest rate. The remaining Tables 3 and 4 give corresponding results for the case of GP patterns. $K$ is replaced by $g$ throughout, but the other parameters retain their previous values. The main difference is that equation (13) is no longer valid, and no exact match is possible. Instead, equation (19) defines values of $g$ which provide good, but not exact, fits between SL and $\{E_p\}$. Rather than being asymptotic to a value of $g$, the locus of solutions to equation (19) decreases steadily with increasing $i$. Thus the adequacy ranges in the geometric case do not narrow quite as rapidly as those observed with arithmetic progressions. This effect is less marked in Table 4, suggesting that the materiality criterion is more stringent when applied to GP as against AP patterns. The general observations just described were valid also for the tables corresponding to lives of five and fifteen years, not reproduced here.

### TABLE 3

### MONETARY CRITERION—GEOMETRIC PROGRESSION

### (APAD with ten-year life)

| | | Interest rate % | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 |
| Growth rate % | 10 | 0.23 | 0.31 | 0.39 | 0.46 | 0.54 | 0.62 | 0.69 | 0.77 |
| | 8 | 0.19 | 0.26 | 0.33 | 0.40 | 0.47 | 0.54 | 0.61 | 0.68 |
| | 6 | 0.14 | 0.21 | 0.27 | 0.34 | 0.40 | 0.46 | 0.52 | 0.59 |
| | 4 | 0.10 | 0.16 | 0.22 | 0.27 | 0.33 | 0.39 | 0.44 | 0.49 |
| | 2 | 0.05 | 0.10 | 0.16 | 0.21 | 0.26 | 0.31 | 0.36 | 0.41 |
| | 0 | 0.00 | 0.05 | 0.10 | 0.14 | 0.19 | 0.23 | 0.28 | 0.32 |
| | –2 | 0.05 | 0.01 | 0.04 | 0.08 | 0.12 | 0.16 | 0.19 | 0.23 |
| | –4 | 0.10 | 0.06 | 0.02 | 0.01 | 0.05 | 0.08 | 0.12 | 0.15 |
| | –6 | 0.15 | 0.12 | 0.08 | 0.05 | 0.02 | 0.02 | 0.04 | 0.07 |
| | –8 | 0.21 | 0.17 | 0.15 | 0.12 | 0.09 | 0.07 | 0.05 | 0.04 |
| | –10 | 0.26 | 0.23 | 0.20 | 0.18 | 0.16 | 0.14 | 0.12 | 0.10 |

*Note*: APAD = Average proportionate absolute difference (see equation (21)).

### TABLE 4

### MATERIALITY CRITERION—GEOMETRIC PROGRESSION

### (COUNT with ten-year life)

| | | Interest rate % | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 |
| Growth rate % | 10 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | 8 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| | 6 | 4 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| | 4 | 6 | 3 | 2 | 2 | 1 | 1 | 1 | 1 |
| | 2 | 10 | 4 | 3 | 2 | 2 | 1 | 1 | 1 |
| | 0 | 10 | 10 | 6 | 4 | 3 | 2 | 1 | 1 |
| | –2 | 10 | 10 | 10 | 6 | 4 | 3 | 3 | 3 |
| | –4 | 5 | 8 | 10 | 10 | 9 | 6 | 4 | 3 |
| | –6 | 3 | 4 | 6 | 9 | 10 | 10 | 9 | 8 |
| | –8 | 2 | 3 | 3 | 4 | 6 | 8 | 9 | 10 |
| | –10 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 6 |

*Note*: COUNT = Number of periods with absolute differences that do not exceed 10% of the SL depreciation figure (see equation (23)).

In order to explore the relationships in more detail, further data sets were prepared. The first was designed to illustrate the relative effects of varying asset life and interest rate on the robustness of the SL proxy. It utilizes the concept of an adequacy range $AR(N,i)$ as illustrated in Tables 1 through 4. Thus, for APs and the monetary criterion

$$AR(N,i) = \max_K\{K \mid APAD(N,i,K) \leq a\} - \min_K\{K \mid APAD(N,i,K) \leq a\} \quad (24)$$

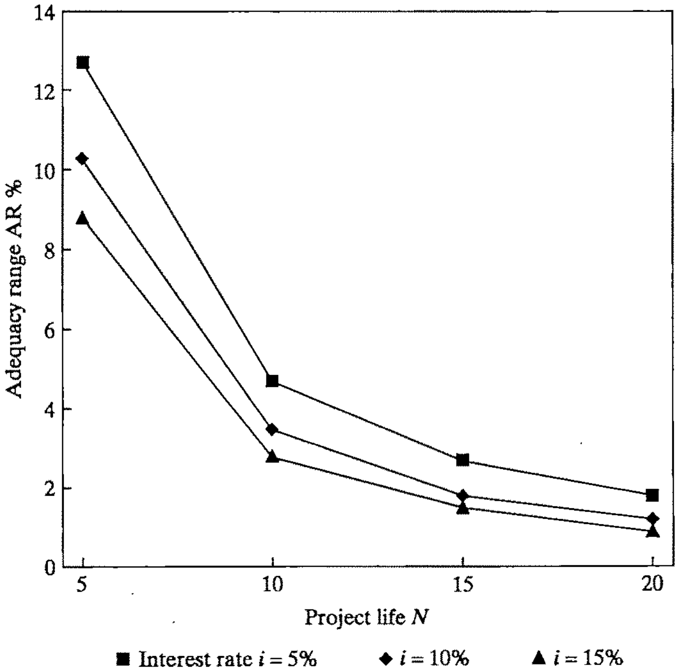
and, for the materiality criterion

$$AR(N,i) = \max_K\{K \mid COUNT(N,i,K) = N\} - \min_K\{K \mid COUNT(N,i,K) = N\} \quad (25)$$

Similar formulas with $K$ replaced by $g$ are used for the geometric case. Figures 3 and 4 plot the adequacy ranges of relative step size against $N$ for interest rates of 5 per cent, 10 per cent and 15 per cent, for the monetary and materiality criteria respectively, using the rigorous 0.1 acceptance level. Similar plots for the GP case are displayed in Figures 5 and 6. In all cases it can be seen that increases in both asset life and in interest rate have the effect of reducing the adequacy range, and that the latter is particularly sensitive to changes in asset life. This is likely to be

FIGURE 3

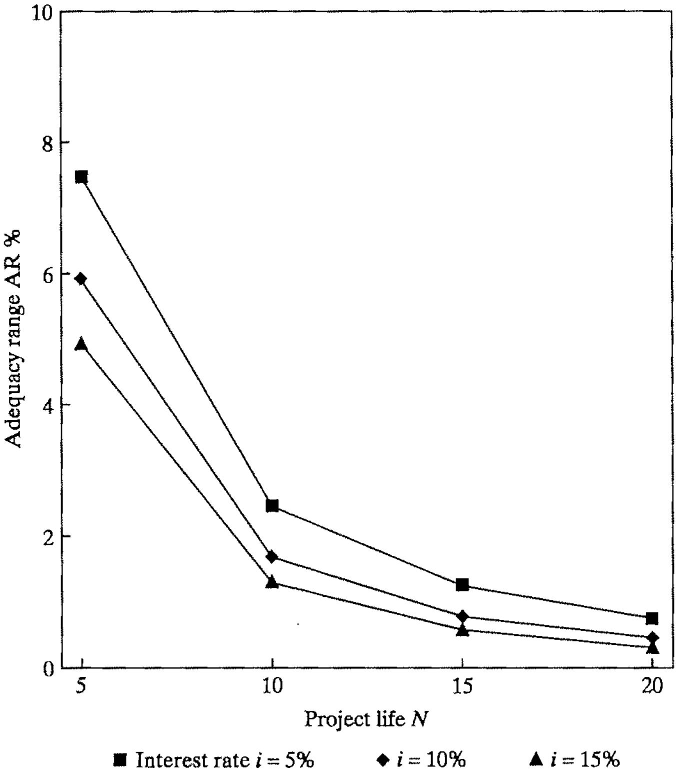
ADEQUACY RANGES—MONETARY CRITERION (APAD) (AP PATTERNS)



APAD is defined in equation (21); AR is defined in equation (24); Acceptance level $a = 0.1$

FIGURE 4

ADEQUACY RANGES—MATERIALITY CRITERION (COUNT) (AP PATTERNS)



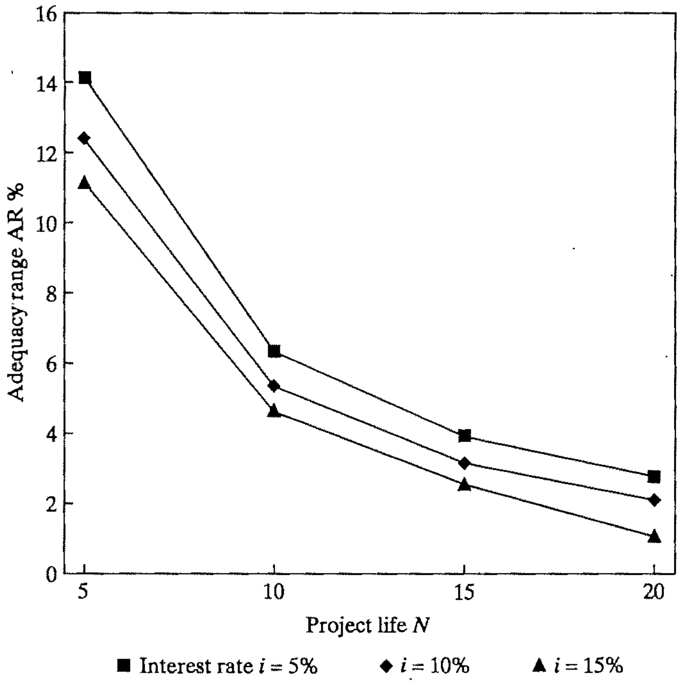
COUNT is defined in equation (23); AR is defined in equation (25);
Acceptance level $a = 0.1$

due to the increasing dominance of the compounding effect for large $N$. As already remarked, the nature of the solution to equation (19) would indicate that, for large enough $N$, there might be no adequate proxies at all for GP cases, a point well illustrated in Figure 6. Once again, the materiality criterion is seen to be a more demanding than the monetary one, as can be seen by comparison of the vertical scales in the corresponding pairs of graphs. These figures illustrate the relative significances of the variables involved in the calculations. The use of the less rigorous 0.2 acceptance level would materially increase the adequacy ranges in all four figures, but the patterns would remain the same.

As indicated above, both 'monetary' and 'materiality' criteria depend upon the acceptance level $a$ that is specified, and the final data sets were designed to see how sensitive the proxy might be to changes in that parameter. In the preceding figures the value of $a$ was held at 0.1. In Figures 7 through 10 adequacy ranges are plotted against acceptance levels from 0.05 to 0.2, and with asset lives of five, ten and fifteen years while holding the interest rate constant at 10 per cent per annum. As

FIGURE 5

ADEQUACY RANGES—MONETARY CRITERION (APAD) (GP PATTERNS)

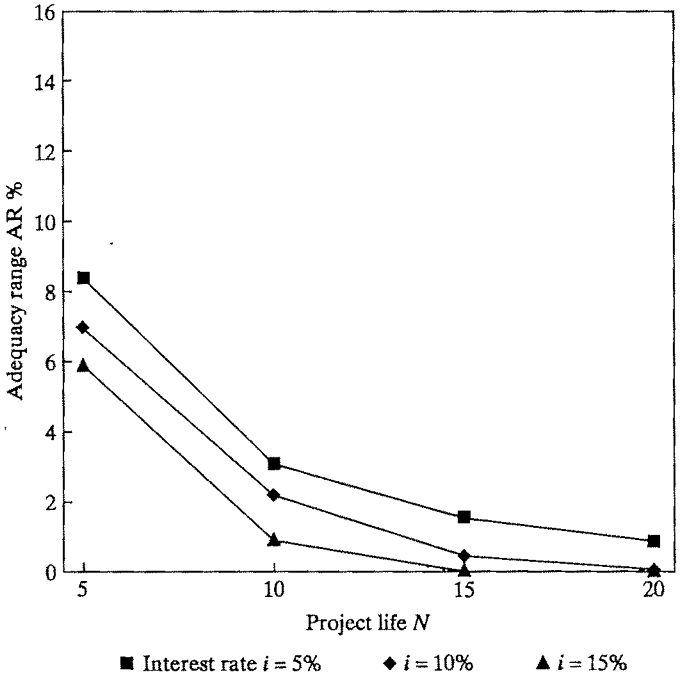


APAD is defined in equation (21); AR is defined in equation (24), replacing $K$ by $g$; Acceptance level $a = 0.1$

shown in Figures 3 to 6, increases in interest rates tend to narrow the range of cash flow patterns that can be considered to result in SL being an adequate proxy for EEI depreciation, net of interest credit. The interest rate of 10 per cent might well therefore be regarded as a relatively demanding one in view of the rates of interest currently prevailing in most developed economies. Once again, the figures show the effect of increasing $N$ is to reduce the adequacy ranges markedly, while the latter increase almost linearly with the acceptance level in both the AP and GP cases, under monetary (APAD) and materiality (COUNT) criteria alike. It is clear that the definition of adequacy in terms both of the criterion and the level of deviation accepted as adequate, materially affects one's judgment of the suitability of SL as a proxy for EEI. As noted earlier, the patterns of net benefits under which SL adequately proxies for the net EEI depreciation impact on shareholders' equity are mostly those with reducing flows. Figures 7 and 8 show that for both arithmetic and geometric progression patterns of benefits the relaxation of the rigorous 0.1 acceptance level to 0.2 using the monetary criterion typically doubles the adequacy range for all lifetimes. For lives as short as five years the range, using 0.2, is almost 16 per cent under GP and 21 per cent for AP, which is very supportive of SL as being an adequate proxy with declining flows of benefit. Even with lives of ten

FIGURE 6

ADEQUACY RANGES—MATERIALITY CRITERION (COUNT) (GP PATTERNS)

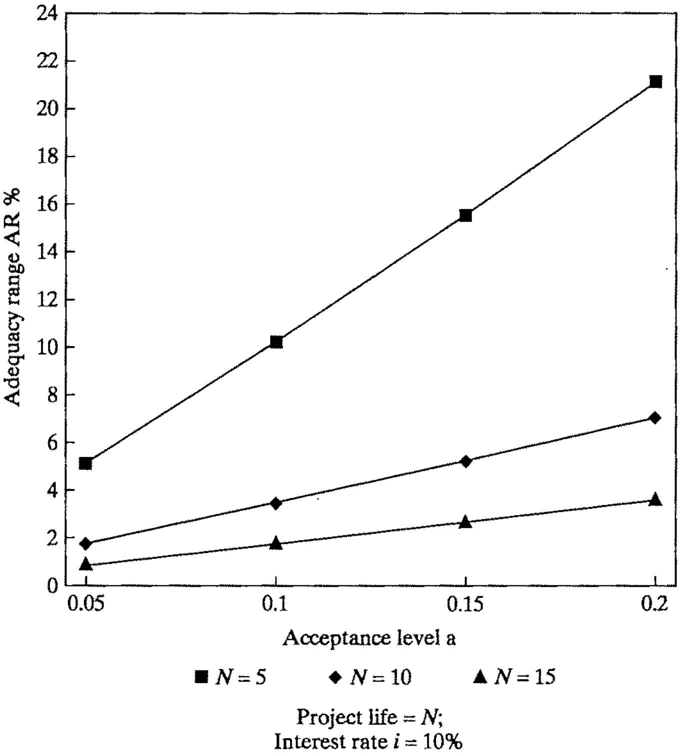


COUNT is defined in equation (23); AR is defined in equation (25), replacing $K$ by $g$; Acceptance level $a = 0.1$

years the range is over 6 per cent for GP and AP, which is again relatively supportive of the proxy relationship. It is only for the longer project lives, for example, of fifteen years, that the adequacy range at 0.2 acceptance level narrows sufficiently to be questionable. Even at that life, the range of 3 per cent may well be quite acceptable. It is likely that the rate of annual decline in the value of benefits from owning long-lived assets will be less than that for short-lived assets and within a narrower range of rates. That in turn suggests that the sensitivity to lives shown in Figures 7 to 10 may be less important than could appear on first consideration in terms of the present analysis of SL depreciation. Overall, then, Figures 7 and 8 suggest that SL is likely to be a satisfactory proxy for EEI net depreciation if one uses acceptance levels of 0.2 or more and the well known average percentage absolute difference criterion of performance. As stated above, APAD does not necessarily provide a sufficiently rigorous criterion if one wants any deviation from the required fundamental economic value not to be extreme in any reporting period. That led to the proposal of the materiality criterion. This article has adopted the very demanding requirement that the differences between SL and net EEI depreciations should fall within the acceptance level in *all* years of the asset's life.

FIGURE 7

SENSITIVITY TO ACCEPTANCE LEVELS—MONETARY CRITERION (AP PATTERNS)



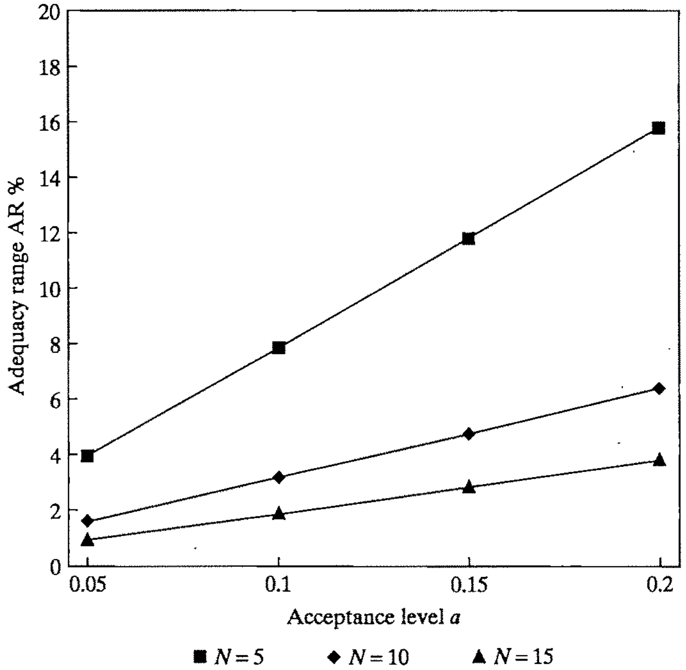
Reference to Tables 2 and 4 suggests, however, that the adequacy range is not likely to be very sensitive to the number of years during which acceptability is required, if one is to keep that number sufficiently high. This aspect of the adequacy relationship therefore will not be pursued further here. Figures 9 and 10 explore the sensitivity of the adequacy ranges to acceptance levels using the demanding materiality criterion.

It is noteworthy that when using an acceptance level of 0.1 the materiality criterion produces no adequacy range for some GPs at the 10 per cent rate of interest. (This observation can also be made from Figure 6, which demonstrates the marked decline in adequacy under materiality as asset lives approach fifteen years.) The move to the acceptance level of 0.2 noticeably improved adequacy, however, at least doubling the range in both AP and GP cases.

Figure 9 shows that at an acceptance level of 0.2 the adequacy ranges for APs move from under 2 per cent for a fifteen-year life, through about 4 per cent for a ten-year life, to 12 per cent for a five-year life. Again we observe the major impact of asset lives on adequacy—but the likely relationship between asset lives and the range of rates of decline of resulting benefits (that was identified above) needs to

FIGURE 8

SENSITIVITY TO ACCEPTANCE LEVELS—MONETARY CRITERION (GP PATTERNS)



Project life = $N$;
Interest rate $i = 10\%$

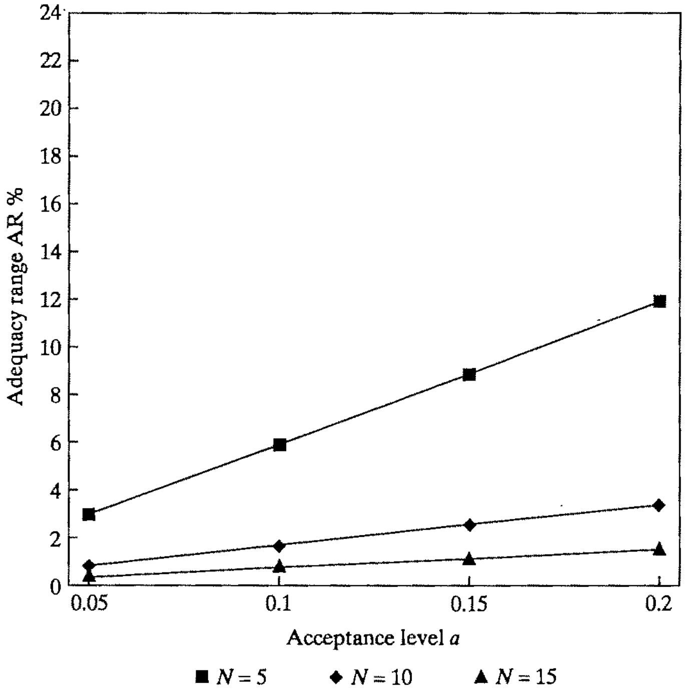
be taken into account here also. Thus the ranges that are considered to be acceptable would realistically be expected to decline with increasing asset lives, so that the impact of the lives on judgments made from observation of the reported figures might reasonably be less than would result from an unthinking comparison of the lines on the graphs. The observations from Figure 10 for GPs, under the materiality criterion are similar to those for APs in respect of the 0.2 acceptance level. Nevertheless, at that level the range is greater at all identified asset lives and therefore the evidence in support of SL as a proxy using the criterion is somewhat stronger than for APs.

Overall, examination of the tables and graphs suggests the following conclusions:

1. Increasing the asset life produces a marked deterioration in the goodness-of-fit irrespective of growth rate, relative step size or interest rate.
2. Increasing the interest rate also markedly reduces the goodness-of-fit.
3. In general, unless the interest rate is low, only patterns of decreasing annual benefits (i.e., $K < 0$ or $g < 0$) can produce a good fit.
4. The above observations hold for both adequacy criteria, and for both AP and GP patterns.

FIGURE 9

SENSITIVITY TO ACCEPTANCE LEVELS—MATERIALITY CRITERION (AP PATTERNS)



Project life = $N$;
Interest rate $i = 10\%$

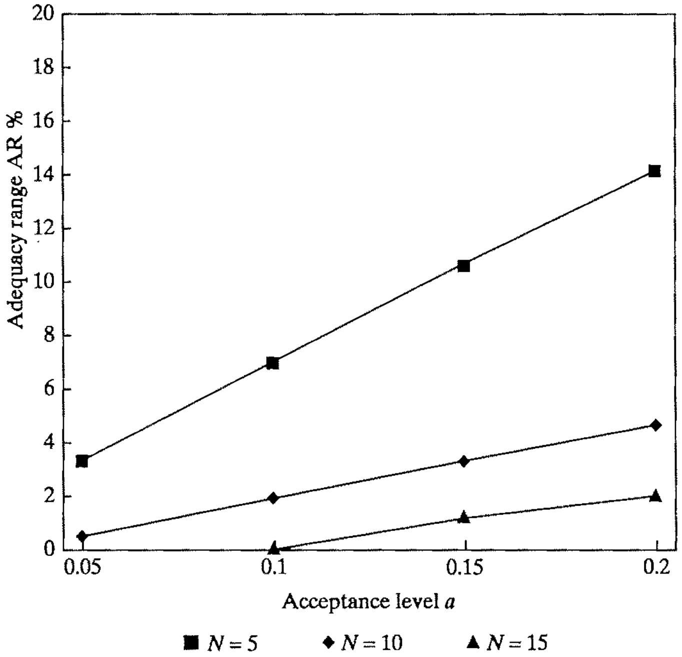
5. The 'materiality' criterion is more stringent than the 'monetary' one. This effect is most marked for geometric patterns.
6. Raising the limits of acceptability predictably extends considerably the range of benefit patterns that meet the stated criteria that define the SL proxy as adequate. Less predictably, given the complexity of the relationships, that extension tends to be directly proportional to the raising of the acceptance level.
7. Using a 0.2 acceptance level, which requires annual differences not to exceed 2 per cent of the original cost of fixed assets under historical cost accounting, the range of rates of decline that meet the stated adequacy criteria could be considered by many people to be reasonable. This is particularly true given the difficulties of forecasting patterns of benefits in the highly uncertain environment of most current businesses.

## FUTURE RESEARCH

This article outlines results of deterministic research using straightforward patterns of AP and GP growth or decline of benefits from owning fixed assets. The nature of the type of service provided by fixed assets suggests to us that such patterns will

FIGURE 10

SENSITIVITY TO ACCEPTANCE LEVELS—MATERIALITY CRITERION (GP PATTERNS)



Project life = $N$;
Interest rate $i$ = 10%

frequently be realistic—as the net value of services rendered could often reduce over time consequent on wear and tear and on relative technological redundancies. Clearly the patterns explored have varied in the investigation—both in the time over which they are spread and the rates of change. The authors did introduce random perturbations into the pattern of flows as a subsequent analysis, but the impact appeared to be negligible and detailed results are not therefore reported here.

It would be possible to explore other patterns of benefit—for example, growth of benefits followed by decline or of decline followed by growth. Clearly our deterministic study has shown that patterns of decline of benefits are the ones that produce the best fits between the two depreciation schedules. The relationships are such that the inclusion of growth within an overall declining pattern of benefits will almost certainly reduce the goodness-of-fit. Furthermore, with variable patterns it seems likely that the complexity of the relationships would make interpretation difficult. The authors' judgment was that it was likely to be unproductive to explore goodness-of-fit under more complex patterns of benefit—but others may have alternative perceptions that prove to be correct.

A more promising line of future research seems likely to be an empirical study of the expectations of managers concerning the pattern of benefits that they typically expect from fixed assets. There are arguments in the literature (e.g., Baxter, 1971) that increasing repair costs, and resulting down time, associated with aging of machinery can lead to a pattern of declining net benefits for major classes of depreciated assets. Similar thinking has influenced value judgments implicit in our interpretation of our findings. Nevertheless, the reasonableness of such expectations is a matter for empirical enquiry which could usefully be conducted.

## CONCLUSION

The evidence provided by the above mathematical and simulation-based analysis appears to provide some support for the use of SL in practice. It shows that there are many combinations of patterns of benefits from ownership and interest rates for which SL can be considered a reasonable proxy. Those patterns seem likely frequently to be found in practice. Therefore the above analysis provides a possible defence for the use of straight-line depreciation under defined circumstances.

Obviously judgments concerning levels of acceptability are subjective and reflect the individual experiences and perceptions of the reader. The information provided in this paper is, however, sufficient to allow readers to derive their own conclusions. Our analysis suggests that SL depreciation may be useful because it provides figures with economic meaning under defined and often realistic assumptions in an environment where uncertainty raises doubts about the validity of most estimates of the monetary value of future benefits to be gained by owning depreciable fixed assets. What appears to be a completely arbitrary and almost meaningless algorithm might, after all, be a reasonable proxy for a relatively sophisticated economic calculation. Of course, in some circumstances it obviously will not be! Therefore it is important to identify the circumstances in which the SL proxy is adequate and therefore defensible by reference to the logic of EEI. This article addresses that issue for patterns of benefit that approximate to arithmetic or geometric progressions.

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## APPENDIX 1

## EEI DEPRECIATION

As shown in equations (A1.1) and (A1.3) below, EEI represents the wealth created by the investment during the accounting period. It shows the interest adjusted portion of the NPV which can be attributed to the cash value of the benefits (hereafter referred to merely as 'benefits') relating to that period. As indicated above, it differs from NPV and IRR variants of economic income because it can report only 'realized' income and does not incorporate in reported income gains which are attributed to future periods. The basic mathematical relationship which defines EEI has the form:

$$EEI_p \equiv C_p - C_p(1+i)^{-p}\left(\sum_{t=1}^{N} C_t(1+i)^{-t}\right)^{-1} I(1+i)^p \qquad \text{(A1.1)}$$

where $EEI_p \equiv$ the measure of wealth created by the initial investment in reporting period $p$;
$C_p \equiv$ the (cash value of) benefits associated with the investment and arising in period $p$;
$I \equiv$ the cost of (i.e., investment in) the fixed asset at time 0;
$i \equiv$ the interest rate representing the opportunity cost of capital, assumed to be constant; and
$N \equiv$ the number of periods during which the asset is used.

This expression may be simplified by observing that the proportion, $A_p$, of the PV of the benefits (i.e., the proportion which can be attributed to period $p$) is used to allocate the interest-adjusted initial investment $I(1 + i)^p$, where

$$A_p = C_p(1+i)^{-p}\left(\sum_{t=1}^{N} C_t(1+i)^{-t}\right)^{-1} \qquad \text{(A1.2)}$$

Thus

$$EEI_p = C_p - A_pI(1+i)^p = A_p\left\{\left(\sum_{t=1}^{N} C_t(1+i)^{-t}\right) - I\right\}(1+i)^p \qquad \text{(A1.3)}.$$

The PV profitability is defined as:

$$Z = \frac{\sum_{t=1}^{N} C_t(1+i)^{-t}}{I} \qquad (2)$$

It is easy to show that

$$EEI_p = C_p - C_p\frac{1}{Z} \qquad (1)$$

We assume, as is conventional, that all $C_p$ associated with fixed assets are non-negative. Consideration of equation (1) then indicates that, since $Z$ is the PV profitability index, a positive NPV will yield a positive figure of EEI, a zero NPV will yield a zero EEI and a negative NPV will yield a negative EEI. Thus under the stated assumptions EEI figures are fully compatible with, and interpretable by reference to, the logic of NPV which has frequently been assumed to underlie the contract between owners and managers.[4] For the purpose of this analysis it is assumed that benefits are gained at the end of reporting periods. The inclusion of imputed interest as a cost places EEI in the class of residual income models (see, e.g., Bromwich and Walker, 1998).

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[4] See, for example, Rogerson (1997).

It is clear from equation (1) that the gross depreciation figures $\{C_pZ^{-1}\}$, which include the interest charges, follow the pattern of the benefits that are associated with the fixed asset. They would be greater than conventional depreciation figures that allocate initial cost by reference to a notional pattern of benefit. This is because EEI figures include the opportunity cost of capital in the book value of the asset which has to be written off against income. If benefits $\{C_p\}$ are constant, in each year EEI affects net equity holders' funds to exactly the same extent as the annuity method of depreciation (Estes, 1981, p. 7) and could be perceived as related to that approach. Indeed, the entries to the fixed asset account would be the same as with the annuity approach: in each period the asset account is debited with interest on the net balance outstanding and credited with depreciation (see Grinyer, 1987). Thus the net effect of the EEI depreciation calculations on the figure of annual additions to equity funds by reason of the period's activities would be the result of the countervailing figures of depreciation charge and interest credit.

Each year the figure debited to the asset account in respect of notional interest, and consequently credited to reported equity funds, declines as the asset's 'book value' falls because of annual depreciation. The interest credit for period $p$, $R_p$, in respect of an asset acquired at time 0, can be found as follows

$$R_p = i\left[I(1+i)^{p-1} - \frac{1}{Z}\sum_{t=1}^{p-1} C_t(1+i)^{p-1-t}\right] \tag{A1.4}$$

with $R_1 = iI$.

The net reduction in the equity holders' funds at the end of the accounting period, $p$, is found by deducting the interest credit, $R_p$, from the gross depreciation charge $C_pZ^{-1}$, and can be represented by $E_p$ as follows:

$$E_p = \frac{1}{Z}\left[C_p + i\sum_{t=1}^{p-1} C_t(1+i)^{p-1-t}\right] - iI(1+i)^{p-1} \tag{A1.5}$$

$E_p$ is the net charge against equity for period $p$ under EEI. (It is the EEI depreciation charge for the period reduced by the interest credit to equity funds during the period.) The term will be referred to below as 'the EEI charge'. It can be shown that the sum of such $E_p$ charges over the life of an asset is equal to the initial investment:

$$\sum_{p=1}^{N} E_p \equiv I \tag{7}$$

It follows that the figures $E_p$ can be viewed as the equivalents to conventional depreciation charges under historical cost based accruals accounting, under which net profit is intended to reveal the net change in equity holders' funds.

The idea of accounting for the opportunity cost of interest as a cost has a long history (Scovell, 1924; Shwayder, 1970; Anthony, 1975). It is fundamental to the idea of 'residual income' which is now in management accounting practice and has an extensive literature recently reviewed by Bromwich and Walker, 1998. Nevertheless, to date there is little sign that practitioners are prepared to depart from the convention of objectivity which requires the evidence of actual transactions before costs are recorded in published financial statements.[5]

## APPENDIX 2

## MATHEMATICAL APPENDIX

This appendix provides the detailed analysis that supports the mathematical relationships between SL depreciation and EEI changes ($E_p$) that are stated in the main text. After summarizing the relevant equations from the text (for the convenience of the reader) it presents mathematical analysis of the position given arithmetic and then geometric patterns of cash flows.

The basic defining relations for EEI depreciation are:

$$Z = \frac{\sum_{t=1}^{N} C_t(1+i)^{-t}}{I} \tag{2}$$

$$E_{p+1} = (1+i)E_p + \frac{(C_{p+1} - C_p)}{Z} \tag{5}$$

together with the derived 'conventional' depreciation identity

$$\sum_{p=1}^{N} E_p \equiv I \tag{7}$$

### AP BENEFIT PATTERNS

For the special case of a benefit pattern $\{C_p\}$ which is an arithmetic progression we have

$$C_p = C_1 + (p-1)S \quad p = 2, 3, \ldots, N \tag{A2.1}$$

where $S$ is the step-size, that is, $C_{p+1} - C_p = S$. Substitution in equation (5) gives the recurrence relation

$$E_{p+1} = (1+i)E_p + \frac{S}{Z} \quad p = 1, 2, \ldots, N \tag{15}$$

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[5] Yet, as indicated above, the APB (1972) acknowledged that systematic and rational allocation 'always involves assumptions about the pattern of benefits and the relationship between costs and benefits because neither of these two factors can be conclusively demonstrated'.

which can be solved in terms of $E_1$ to give

$$E_p = (1 + i)^{p-1}E_1 + \frac{S}{Zi}[(1 + i)^{p-1} - 1] \tag{A2.2}$$

The initial value $E_1$ can be found by substituting these values in equation (7). The result is

$$E_1 = \left(I + \frac{NS}{Zi}\right)\frac{i}{(1+i)^N - 1} - \frac{S}{Zi} \tag{A2.3}$$

These forms are not convenient due to the presence of the term $S/Zi$, since $Z$ is a function of $C_1$, $N$, $I$ and $i$. To simplify the analysis we introduce the variable $f$, which is the ratio of the step size $S$ to the critical step size $S^*$, as defined in equation (12), thus

$$S = fS^* = -\frac{ifC_1}{(1+Ni)} \tag{A2.4}$$

Combining this with equation (6) leads to

$$\frac{S}{Zi} = -f\frac{(E_1 + iI)}{(1+Ni)} \tag{A2.5}$$

An important quantity is the difference between the SL value, $I/N$, and the initial EEI depreciation figure, $E_1$. After some manipulation of equations (A2.3) and (A2.5), this can be expressed explicitly as

$$E_1 - \frac{I}{N} = \left(\frac{I}{N}\right)\frac{(1+Ni)[(1+i)^N - 1 - Ni](f-1)}{(1+Ni)[(1+i)^N - 1] + f[1 + Ni - (1+i)^N]} \tag{A2.6}$$

Depending upon the value of $f$, the pattern $\{E_p\}$ will start above or below the SL value of $I/N$, and decline or increase respectively towards the final value $E_N$. To demonstrate this, we observe firstly that the numerator in equation (A2.6) is positive or negative depending as $f$ is greater or less than unity. This follows since $(1 + i)^N$ is greater than $1 + Ni$, for positive $i$ and $N$. Similarly, the denominator is positive for $f$ less than unity. There is, however, an upper bound to $f$ imposed by the condition that $C_p$ be non-negative. For AP patterns this corresponds to the requirement that $C_N \geq 0$, or, from equations (A2.1) and (A2.4), that

$$f < \frac{(1+Ni)}{i(N-1)} \tag{A2.7}$$

It can be shown that the denominator is positive for all such allowable values of $f$, so that $E_1$ is greater or less than $I/N$ according as $f$ is greater or less than unity. Also, from equations (A2.2) and (A2.5), we find that the first and second differences of the sequence $\{E_p\}$ are given by

$$\Delta E_p \equiv E_{p+1} - E_p = \frac{i(1+i)^{p-1}}{1+Ni}[(1+Ni)E_1 - f(E_1 + iI)] \tag{A2.8}$$

and

$$\Delta^2 E_p \equiv \Delta E_{p+1} - \Delta E_p = i\Delta E_p \tag{A2.9}$$

A similar analysis shows that *both* the first and second differences are uniformly negative if $f > 1$, and both are uniformly positive if $f < 1$. Thus, in the case $f > 1$, the sequence $\{E_p\}$ starts with a value above the level $I/N$ and then declines at an increasing rate to a final value $E_N$ that is less than the SL value of $I/N$. The converse is true if $f < 1$; that is, $E_p$ starts below the SL level at rises at an increasing rate.

It is important to establish that the greatest deviation of $E_p$ from $I/N$ occurs when $p = N$. Due to the monotonicity of $\{E_p\}$ it is sufficient to show that, for $f > 1$

$$\frac{I}{N} - E_N > E_1 - \frac{I}{N} > 0 \tag{A2.10}$$

The second inequality has already been proved above, while the first may be expressed as

$$E_1 + E_N < \frac{2I}{N} \quad \text{for} \quad f > 1 \tag{A2.11}$$

The difference between $I/N$ and $E_N$ can be written as

$$\frac{I}{N} - E_N = \left(\frac{I}{N}\right)\frac{(1+Ni)[Ni(1+i)^{N-1} + 1 - (1+i)^N](f-1)}{(1+Ni)(1+i)^N + f[1 + Ni - (1+i)^N]} \tag{A2.12}$$

Adding equations (A2.6) and (A2.12) yields the identity

$$\frac{2I}{N} - E_1 - E_N = \left(\frac{I}{N}\right)(1+Ni)\frac{[Ni\{1 + (1+i)^{N-1}\} - 2\{(1+i)^N - 1\}](f-1)}{(1+Ni)[(1+i)^N - 1] + f[1 + Ni - (1+i)^N]} \tag{A2.13}$$

By expansion in powers of $i$ it can be shown that, since $i$ and $N$ are both positive, the right-hand side of equation (A2.13) has the same sign as that of the factor $(f - 1)$, and so $(E_1 + E_N)$ is less than $2I/N$ for $f > 1$, as asserted. The inequalities converse to those of equation (A2.10) may be derived in a similar manner for the case $f < 1$. The same result can be expressed in terms of the relative step size $K$ that is used in the main text. From equation (A2.4) we have that

$$K = \frac{S}{C_1} = \frac{if}{1 + Ni} \tag{A2.14}$$

Assuming negative step sizes, it follows that $K$ is less than or greater than $K^*$, depending on whether $f$ is greater or less than unity. Hence, for example, $E_1$ will be greater than $I/N$ if $K < K^*$. Figure 1 illustrates this behaviour for two particular values of $K$.

The materiality criterion introduced in the main text refers to the number of $E_p$ values that fall within a specified band centred on the SL value of $I/N$. If the width of this band is defined by a fraction $e$ of $I/N$, all $N$ values will lie within the band provided that $E_N$ is no further than $e.I/N$ from the datum. This follows from the result immediately preceding, and suggests a method for determining the adequacy range of step-sizes for AP patterns. If $I/N - E_N$ is set equal to $e.I/N$ in equation (A2.13), the latter may then be solved for $f$, which in turn defines the upper limit of the relative step-size range by equation (A2.14). The explicit expression is not shown here.

## GP BENEFIT PATTERNS

Benefit patterns of the geometric progression type are generated from the recurrence relation

$$C_p = (1+g)^{p-1}C_1 \tag{17}$$

where $g$ is the growth rate. Substitution into equation (5) gives the corresponding relation for the net EEI depreciation, namely

$$E_{p-1} = (1+i)E_p + g(1+g)^{p-1}\frac{C_1}{Z} \tag{18}$$

This can be solved for $E_p$ to give

$$E_p = (1+i)^{p-1}\,E_1 + (1+i)^{p-2}\frac{gC_1(A^{p-1}-1)}{Z(A-1)} \tag{A2.15}$$

where

$$A = \frac{(1+g)}{(1+i)} \tag{A2.16}$$

The terms $E_1$ and $C_1/Z$ can be eliminated by using equations (2) and (6), so that

$$E_p = \frac{I}{A^N-1}\{g(1+g)^{p-1} - iA^N(1+i)^{p-1}\} \tag{A2.17}$$

In general, the shape of $\{E_p\}$ is approximately parabolic, as can be seen from the form of the first difference, namely

$$\Delta E_p \equiv E_{p+1} - E_p = \frac{I}{A^N-1}\{g^2(1+g)^{p-1} - i^2A^N(1+i)^{p-1}\} \tag{A2.18}$$

Clearly, $\{E_p\}$ has a unique minumum, given by the condition that $E_{p+1} = E_p$. Symmetry considerations indicate that the materiality criterion is most likely to be satisfied when this minumum lies approximately at the midpoint of the asset life, that is, at $p = {}^1\!/\!_2N$. If this value of $p$ is substituted in equation (A2.18), the first difference is zero when

$$\left(\frac{g}{i}\right)^2 = \left(\frac{1+g}{1+i}\right)^{\frac{1}{2}N+1} \tag{19}$$

which is the condition quoted in the main text.

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RAY DONNELLY

# Earnings Persistence, Losses and the Estimation of Earnings Response Coefficients

One of the major themes of capital markets accounting research concerns mapping the relation between accounting earnings and security returns. There is still not agreement on the functional form of this relation. The models analysed here are those where: the level of earnings alone, the change in earnings alone, or both, scaled by price, are used as explanatory variables for returns. This article demonstrates that if earnings are either completely permanent or entirely transitory, the earnings response coefficients (ERCs) estimated by levels and changes models should coincide. However, if earnings comprise a mixed process of permanent and transitory components, the ERC estimated by the levels will differ from that estimated by the changes model. Using losses to identify transitory components in earnings, empirical evidence consistent with these predictions is provided.

A combined model using both the level of, and change in, earnings is justified as a weighted average of an earnings and a book value valuation model (e.g., Ohlson, 1989). An alternative rationalization concerns the mitigation of an errors-in-variables problem associated with the estimation of unexpected earnings (Ali and Zarowin, 1992). The results for the combined model are more consistent with the latter. In this context, some previous empirical studies perceive the levels variable as a useful addition to the changes variable when there are transitory components in earnings. However, the evidence reported here suggests that the level of earnings, scaled by price, appears to be the fundamental earnings explanatory variable for returns (Ohlson, 1991, p. 1). The changes variable can, when the errors-in-variables problem is not mitigated by other methods, be a useful addition to the levels variable.

**Key words:** Earnings; Losses; Response coefficients.

Market-based accounting research (MBAR) is the term given to that branch of accounting which investigates the relation between accounting data and firm valuation (Bernard, 1989, p. 72). While the compass of MBAR has expanded beyond

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valuation per se, the latter is still a primary focus. Since the seminal work of Ball and Brown (1968) the vast majority of valuation studies have typically addressed the relation between accounting earnings and security returns. This is not surprising given the pre-eminence of historical cost earnings as a summary measure of the information in financial statements.

There has been some debate on the functional form of the return–earnings relation. This article initially considers the following alternative specifications of the return–earnings relation, levels and changes:

$$P_t/P_{t-1} = \alpha_1 + \beta_1(x_t/P_{t-1}) + e_t \tag{1}$$

$$P_t/P_{t-1} - 1 = \alpha_2 + \beta_2(\Delta x_t/P_{t-1}) + e_t' \tag{2}$$

where $P_t$ is the price of a share at time $t$,

$x_t$ is earnings for the period to time $t$,

$\Delta x_t$ is $(x_t - x_{t-1})$, the difference between the earnings of period $t$ and those of period $t-1$,

$\beta_1$, $\beta_2$ and are the earnings response coefficients (ERCs) of the respective models, and

$e_t$, and $e'_t$ are disturbance terms.

Ohlson (1991) concludes that the levels variable is the primary independent variable for return. Therein cases are considered where earnings are either permanent (follow a random walk) or transitory (non-recurring). The current study considers situations where earnings follow a mixed process with both permanent and transitory components.

Models such as (1) and (2) have been evaluated empirically by Easton and Harris (1991) for the U.S. and Strong (1993) for the U.K. Ali and Zarowin (1992) examine the performance of the models for subsamples of firms which differ in the persistence of their earnings. These three studies estimate ERC as the average slope of a series of annual cross-sectional regressions of return on earnings. Invariably the ERCs estimated are much smaller than theory would suggest. An alternative approach, which attempts to control for the two most pervasive sources of bias in the estimation of ERCs, is employed here. First, a variation of the panel data model employed by Board and Walker (1990) is used to overcome the correlated omitted variables bias induced by restricting the ERC to be a cross-sectional constant (see Christie, 1987, pp. 245–6). Secondly, the errors-in-variables bias induced by price anticipation of earnings is controlled for by employing the methodology of Kothari and Sloan (1992). This method has the added advantage of controlling for differential price anticipation of good versus bad news. As well as controlling for the major sources of bias in estimating ERCs, this article extends Strong's analysis for the U.K. by dichotomizing the sample into firms with essentially permanent earnings and those whose earnings clearly contain transitory elements.

Easton and Harris (1991), Strong (1993) and Ali and Zarowin (1992) also examine a combined changes and levels model (see (3) below).

$$P_t/P_{t-1} = \alpha + \beta(x_t/P_{t-1}) + \gamma(\Delta x_t/P_{t-1}) + u_t \tag{3}$$

The notation is as for (1) and (2). The ERC of the combined model is ($\beta + \gamma$) and its disturbance term is $u_t$. This is essentially a weighted average of equations (1) and (2). In order to establish if the levels and changes models are substitutes or complements, and for comparability with prior research, the empirical analysis also estimates the combined model.

## MODELLING THE RETURN–EARNINGS RELATION

### *Levels Versus Changes Specifications*

Assuming, inter alia, that earnings follow a random walk with drift, Ohlson (1991) derives the following model:

$$(P_t + d_t)/P_{t-1} = R_t = \varphi(x_t/P_{t-1}) \tag{4}$$

where $\varphi = 1 + 1/r$, and $r$ is the cost of capital, and
$d_t$ = the dividend paid at time $t$.

Thus, the level of earnings scaled by price is the appropriate explanatory variable for return. He also shows that the changes variable is equivalent only when $d_t = x_t$, that is, earnings follow a random walk. Equation (1) can be viewed as an empirical version of equation (4).

The levels model, equation (1), can also be justified by a book value valuation model and the assumption of clean surplus accounting (Ohlson, 1991, p. 14). This is the approach used in Easton and Harris (1991) and Strong (1993). A firm's book value serves as an indicator of its market value, $BV_{it} = MV_{it}$. Return to equity shareholders is the change in market value. Since, assuming no dividends, a \$1 increase in earnings increases book value by \$1, that is, $\Delta BV_{it} = x_{it}$. It follows trivially that $P_{it}/P_{it-1} - 1 = \Delta MV_{it}/MV_{it-1} = x_{it}/MV_{it-1}$. Accordingly, empirical estimates of the slope coefficient in equation (1), $\beta_1$, are expected to approximate one.

Both Easton and Harris (1991, p. 22) and Strong (1993, p. 70) justify the changes model using an earnings valuation model which assumes a constant P/E ratio, and thus is similar to that of Kothari (1992, pp. 178–80). The latter is used as a starting point for the analysis here. It is initially assumed that: (a) earnings are the only value relevant information; (b) earnings equal dividends[1]; (c) reported earnings follow a random walk; and (d) there is a constant risk adjusted discount rate, $r$. Using the above assumptions, Kothari (1992) shows that the ERC is identical and equal to $1/r$ in both equations (1) and (2).

Ohlson (1999) shows that if transitory earnings are (a) not relevant in forecasting next period's aggregate earnings, and (b) unpredictable, then it follows that they are value irrelevant. The latter property implies an ERC of zero for the levels and changes models outlined in equations (1) and (2).[2]

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[1] The assumption that $d_t = x_t$ is also useful when extending the analysis to the case where earnings are completely transitory, since a less than 100 per cent payout ratio would not be consistent with totally transitory earnings.

The literature outlined above shows that if earnings can be modelled as either a random walk or a completely transitory process, then the levels and changes models are equivalent. The more realistic scenario where some elements of earnings are permanent, and other parts transitory, is now considered. It is well known that present values are additive. The following equation for a firm with both permanent and transitory earnings is then easily derived:

$$\begin{aligned} P_t &= 0 \cdot x_t^T + \left(\frac{1}{r}\right) x_t^P \\ \frac{P_t}{P_{t-1}} &= \left(\frac{1}{r}\right) \frac{x_t^P / X_t}{P_{t-1}} \cdot x_t \\ &= \left[\left(\frac{1}{r}\right) \frac{x_t^P}{x_t}\right] \frac{x_t}{P_{t-1}} \end{aligned} \tag{5}$$

where $x_t^P$ and $x_t^T$ are the permanent and transitory components of earnings, respectively.

Equation (5) shows that the ERC for the levels model is a weighted average of the ERCs from the transitory and permanent elements of earnings; the weights being equal to the proportion of earnings accounted for by each component.[3] Similarly, the following expression for the change in earnings model can be derived:

$$\frac{\Delta P_t}{P_{t-1}} = \left[\left(\frac{1}{r}\right) \frac{\Delta x_t^P}{\Delta x_t}\right] \frac{\Delta x_t}{P_{t-1}} \tag{6}$$

Once the possibility that a company's earnings can be split into components that follow different time series processes is allowed, the equivalence of ERCs estimated by levels and changes models is no longer guaranteed. The relative size of the ERC for the levels and changes models relies critically on the relative sizes of the ratios $\Delta x_t^P / \Delta x_t$ and $x_t^P / x_t$.

The above analysis suggests the following two hypotheses:

H1: The ERC estimated using the changes model exceeds that estimated using the levels model when $\Delta x_t^P / \Delta x_t$ exceeds $x_t^P / x_t$.

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[2] In Ohlson (1999) the dependent variable is $(P_t + d_t)/P_{t-1}$ and the ERC for transitory earnings is 1. Since all transitory earnings must be paid out in dividends so as not to affect future core earnings, the elimination of $d_t/P_{t-1}$ from the LHS of the model results in a similar treatment for $x_t^T/P_{t-1}$ on the RHS ($x_t^T$ being transitory earnings). The treatment here is analogous to that in Beaver *et al.* (1980).

[3] The transitory earnings ERC is zero, so this term does not appear in the equation. If cum-div prices were used $R_t = [1 + 1/r(x_t^P/x_t)]x_t/P_{t-1}$.

H2: When the time series of earnings approaches a random walk, ERCs estimated using a levels model will be approximately equal to those estimated using a changes model. However, they will differ for firms which have both transitory and permanent components in their earnings.

### *The Combined Levels and Changes Model*

Both Easton and Harris (1991) and Strong (1993), drawing on Ohlson (1989), justify the combined model (equation (3)) as a weighted average of an earnings valuation model and a book value valuation model. The former underpins the changes variable and the latter, assuming clean surplus accounting, the levels variable. Using Ohlson (1989), one would expect these weights to depend critically on the persistence of the earnings series. The more persistent the earnings, the greater the emphasis placed on the earnings valuation model and hence the changes variable.

The use of a combined model is at variance with the analysis in this article, which uses an earnings valuation model to justify the return–earnings relation. This is not to suggest that a combined book value valuation model and earnings valuation model would not be useful. There is both theoretical (Ohlson 1995; Feltham and Ohlson, 1996) and empirical (Collins *et al.*, 1999) evidence that book value should be in the model as a proxy for the expected value of future *normal* earnings. Rather, it is the use of both valuation approaches to justify two earnings variables, which are essentially substitutes, and strictly equivalent under certain assumptions, that is questioned. The fact that articles such as Feltham and Ohlson (1996) and Collins *et al.* (1999) incorporate book value as well as earnings can be interpreted as further evidence that the level of earnings scaled by price does not represent a book value valuation model. The fact that U.K. earnings are unlikely to conform to the clean surplus relation (Walker, 1997, p. 352), makes this rationale for the level of earnings even less plausible.

Ali and Zarowin (1992) justify the combined model in a different manner. They argue that returns are a function of unexpected earnings.[4] The changes variable is a reasonable proxy for unexpected earnings when earnings are purely permanent. There is a greater errors-in-variables problem with the changes variable when earnings are not purely permanent, so the levels variable is useful in such a scenario (Ali and Zarowin, 1992, p. 287). Their analysis also predicts that the coefficient on the changes variable increases with earnings persistence and vice versa for the levels.

The analysis here suggests an alternative errors-in-variables rationalization to that of Ali and Zarowin. If, as suggested by Ohlson (1991, p. 15), the levels variable is the primary independent earnings variable for explaining returns, then the changes variable will not be significant in the combined model, provided the errors-in-variables problem has been addressed in its estimation. Accordingly, the combined model is tested to establish if $\beta$ and $\gamma$ are significant, and whether the estimated coefficients are consistent with the arguments in Ohlson (1989, p. 42) and Ali and Zarowin (1992, p. 289), or the alternative errors-in-variables rationalization suggested above.

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[4] Ohlson (1991) shows that this is perfectly consistent with the use of equation (1).

H3: For the combined model, the coefficient on the changes variable increases, and that on the levels variable decreases, as earnings persistence increases.

## DATA AND EMPIRICAL RETURN–EARNING MODELS

Equation (7), below, is used as an empirical proxy for $\Delta x^P/\Delta x$ (see Appendix for details).

$$\frac{1-\sum_{s=1}^{q}\left(\frac{\theta_s}{(1+r)^s}\right)}{\left(\frac{r}{1+r}\right)^d\left[1-\sum_{j=1}^{p}\left(\frac{\phi_j}{1+r}\right)^j\right]}-1 \qquad (7)$$

where $\theta_s$ is moving average parameter $s$ ($s = 1,2\ldots q$),
$\phi_j$ is autoregressive parameter $j$ ($j = 1,2\ldots p$),
$d$ is the number of differences used in estimation,
the $\theta$s and $\phi$s are estimated using an ARIMA ($p,d,q$) model, and
$r$ is the equity capitalisation rate.

To ensure a sufficiently long time series of earnings to estimate equation (7), a sample of companies having the requisite data on Datastream from 1972 until 1989 was used.[5] In addition, the sample was restricted to December year-end firms. This yielded a sample of 179 companies.[6]

Because prior research has shown that the ERC varies cross-sectionally (e.g., Collins and Kothari, 1989; Easton and Zmijewski, 1989), ERCs are estimated using the panel data model outlined in equation (8):

$$\frac{P_{it}}{P_{it-\tau}}-1=\alpha_0+\sum_{i=2}^{N}\alpha_i\lambda_i+\sum_{t=2}^{T}\alpha_t\lambda_t+\sum_{i=1}^{N}\beta_i\lambda_i\frac{E_{it}}{MV_{it-\tau}}+e_{it} \qquad (8)$$

where $P_{it}$ is the price of firm $i$ at time $t$,
$MV_{it-\tau}$ is the market value of equity of firm i at time $t-\tau$,
$E_{it}$ is either the change in, $\Delta x_{it}$, or the level of, $x_{it}$, earnings for firm $i$ at time $t$,

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[5] Since FRS3, which effectively banned extraordinary items, was adopted by some U.K. companies from 1992 and others in 1993, earnings and their persistence has changed fundamentally. Accordingly, it was not really possible to procure a long time series of post-FRS3 earnings.

[6] A drawback of the sample selection procedure is the possible admittance of a survivorship bias. However, this is countered by the benefit that losses for surviving firms will almost certainly be transitory. Since the focus here is on the validity of the predictions of alternative return-earnings models regarding the relation between ERCs and persistence, the latter benefit is thought to outweigh the survivorship problem.

TABLE 1

SUMMARY STATISTICS FOR DEPENDENT AND INDEPENDENT VARIABLES

**Panel A: Data for models where contemporaneous returns are regressed on earnings ($\tau = 1$)**

| | $P_{it}/P_{it-1} - 1$ | $\Delta x_{it}/MV_{it-1}$ | $x_{it}/MV_{it-1}$ |
|---|---|---|---|
| Mean | 0.225 | 0.0199 | 0.1057 |
| *SD* | 0.606 | 0.12 | 0.137 |
| Skewness | 9.7 | 2.47 | −0.36 |
| Kurtosis | 187.7 | 74.7 | 34.04 |
| Maximum | 14.4 | 2.19 | 1.808 |
| Q3 | 0.377 | 0.039 | 0.144 |
| Median | 0.138 | 0.0163 | 0.0975 |
| Q1 | −0.069 | −0.005 | 0.066 |
| Minimum | −0.855 | −1.483 | −1.50 |

**Panel B: Data for estimation of models including one leading year of returns ($\tau = 2$)**

| | $P_{it}/P_{it-2} - 1$ | $\Delta x_{it}/MV_{it-2}$ | $x_{it}/MV_{it-2}$ |
|---|---|---|---|
| Mean | 0.55 | 0.03 | 0.14 |
| *SD* | 1.15 | 0.13 | 0.18 |
| Skewness | 8.6 | 3.72 | 2.88 |
| Kurtosis | 130.6 | 54.2 | 30.25 |
| Maximum | 23.6 | 2.3 | 2.44 |
| Q3 | 0.765 | 0.053 | 0.19 |
| Median | 0.31 | 0.02 | 0.12 |
| Q1 | 0.007 | −0.006 | 0.08 |
| Minimum | −0.91 | −1.07 | −0.89 |

Number of observations = 2,506

In order to conserve space and since the conclusions of the article hinge on models which regress either contemporaneous or contemporaneous with one leading year's return, on unexpected earnings proxies, only the data used to estimate these models are included.

$\lambda_i$ and $\lambda_t$ are dummy variables representing firm $i$ and year $t$ respectively, and $N$ and $T$ are the number of firms and years in the sample respectively.

The model allows for cross-sectional variation in the ERCs and for both time series and cross-sectional variation in the intercept. The variations of the model for which results are presented below are distinguished by the choice of $\tau$ and the choice of proxy for unexpected earnings. For example, the *C*2 regression corresponds to the case where $\tau$ equals two and $E_{it}$ is $\Delta x_{it}$. Summary statistics for the variables used to estimate equation (8) are outlined in Table 1. Details of the ERCs themselves are outlined in Table 2. The estimates are much more in keeping with economic intuition and a theoretical value of $1/r$ than those of Easton and Harris (1991) or Strong (1993).

Table 2

REGRESSION ESTIMATES FOR EQUATION (8) WHERE $\tau = 1, 2, 3$ OR 4.

$$L1/C1: \frac{P_{it}}{P_{it-1}} - 1 = \alpha_0 + \sum_{i=2}^{N} \alpha_i \lambda_i + \sum_{t=2}^{T} \alpha_t \lambda_t + \sum_{i=1}^{N} \beta_i \lambda_i \frac{E_{it}}{MV_{t-1}} + e_t$$

$$L2/C2: \frac{P_{it}}{P_{it-2}} - 1 = \alpha_0 + \sum_{i=2}^{N} \alpha_i \lambda_i + \sum_{t=2}^{T} \alpha_t \lambda_t + \sum_{i=1}^{N} \beta_i \lambda_i \frac{E_{it}}{MV_{t-2}} + e_t$$

$$L3/C3: \frac{P_{it}}{P_{it-3}} - 1 = \alpha_0 + \sum_{i=2}^{N} \alpha_i \lambda_i + \sum_{t=2}^{T} \alpha_t \lambda_t + \sum_{i=1}^{N} \beta_i \lambda_i \frac{E_{it}}{MV_{t-3}} + e_t$$

$$L4/C4: \frac{P_{it}}{P_{it-4}} - 1 = \alpha_0 + \sum_{i=2}^{N} \alpha_i \lambda_i + \sum_{t=2}^{T} \alpha_t \lambda_t + \sum_{i=1}^{N} \beta_i \lambda_i \frac{E_{it}}{MV_{t-4}} + e_t$$

(Models $C\tau/L\tau$ are distinguished by whether $E_{it}$ is the level of, or change in earnings)

**Panel A: Levels models**

| | L1 | L2 | L3 | L4 |
|---|---|---|---|---|
| Average ERC | 3.65 | 6.17 | 6.67 | 6.47 |
| *SD* | 2.61 | 3.91 | 4.26 | 4.98 |
| Median ERC | 3.39 | 5.72 | 5.85 | 5.64 |
| $R^2$ | 36.92 | 57.15 | 52.62 | 62.24 |
| Adj-$R^2$ | 25.98 | 49.72 | 44.41 | 55.69 |

**Panel B: Changes models**

| | C1 | C2 | C3 | C4 |
|---|---|---|---|---|
| Average ERC | 3.77 | 6.21 | 6.21 | 6.56 |
| *SD* | 4.08 | 6.16 | 7.43 | 9.5 |
| Median ERC | 3.07 | 4.53 | 4.3 | 4.0 |
| $R^2$ | 27.35 | 43.31 | 48.18 | 53.11 |
| Adj-$R^2$ | 14.76 | 33.49 | 39.20 | 44.99 |

The first (last) year of earnings included in each of the above regressions is 1976 (1989). Overlapping returns are used when $\tau > 1$.

Based on White's heteroskedasticity-consistent covariance matrix estimator, all of the average ERCs reported above are significant at the .0001 level.

## EMPIRICAL TESTS

In order to examine H1, equation (7) is estimated using the real earnings series from 1972 to 1989 for each company. Firms are sorted on the basis of this proxy for $\Delta x^p/\Delta x$ and allocated to one of five quintiles. Quintile one consists of firms with the lowest $\Delta x^p/\Delta x$s and quintile five comprises those with the highest $\Delta x^p/\Delta x$s. The differences between each firm's ERC estimated by a changes model and that

TABLE 3

AVERAGE DIFFERENCES IN ERC ESTIMATED USING CHANGES AND LEVELS MODELS OUTLINED IN TABLE 2 ($C\tau$–$L\tau$)

| Return window ($\tau$)<br>$\Delta x^P/\Delta x$ | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Quintile | | | | |
| 1 | –0.333 | –1.05 | –1.99 | –0.434 |
| | (.40) | (.05) | (.02) | (.75) |
| 2 | –0.8 | –1.36 | –2.2 | –2.33 |
| | (.02) | (.006) | (.005) | (.02) |
| 3 | 0.33 | –0.27 | –1.06 | –1.44 |
| | (.44) | (.67) | (0.2) | (.07) |
| 4 | .233 | .38 | .22 | .04 |
| | (.66) | (.47) | (.73) | (.96) |
| 5 | 1.2 | 2.5 | 2.7 | 4.6 |
| | (.14) | (.004) | (.03) | (.01) |

Each firm has an individual ERC as outlined in Table 2. ERCs for levels models are subtracted from the ERC of the corresponding changes model to give $C\tau$–$L\tau$. These differences are then sorted by $\Delta x^P/\Delta x$ (equation (7)). Quintile 1 (5) represents firms with low (high) $\Delta x^P/\Delta x$.
Significance levels based on standard *t*-tests are in parentheses.

estimated by the a levels model ($C\tau$–$L\tau$) are outlined in Table 3. The negative values at the top of Table 3, and positive values at the bottom, confirm the prediction that $\Delta x^P/\Delta x$ is positively correlated with the excess of the ERC estimated by the changes model over that estimated by the levels.

Hayn (1995) argues that the responsiveness of return to losses is different from that to profits. The hypothesis is based, primarily, on the fact that shareholders have a put option to liquidate a firm, so continuing losses will not be accepted. A loss, particularly for surviving firms, may be viewed as evidence of transitory or non-perpetuating earnings. Of the 179 companies in the sample, sixty-four reported a loss at least once during the sample period. Table 4 reports the average ($C\tau$–$L\tau$) separately for the 115 companies which never reported a loss (permanent earnings) during the sample period and those that reported at least one loss (some transitory earnings). As predicted, the levels and changes models estimate very similar ERCs for non-loss makers. The final row of Table 4 reports negative values for ($C\tau$–$L\tau$). This is evidence that the ERCs estimated by the levels model are larger than those estimated by the changes model for firms with both transitory and permanent components in their earnings. As well as being consistent with H2, this result is also compatible with Ohlson (1991): the levels variable is, the primary explanatory variable for returns, but the changes variable works just as well when $x_{t-1}/p_{t-1}$ can reasonably be approximated by a constant, that is, earnings follow a random walk.

The results in Tables 3 and 4 are also consistent with Ohlson (1989) and Ali and Zarowin (1992); with the levels variable having a larger coefficient when earnings

### Table 4

### AVERAGE DIFFERENCES IN ERC ESTIMATED USING CHANGES AND LEVELS MODELS OUTLINED IN TABLE 2 ($C\tau$–$L\tau$)

| Return window (τ) | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Subsample | | | | |
| All profits | 0.32 | .63 | .33 | 1.24 |
| | (.35) | (.12) | (.57) | (.12) |
| At least one loss | –0.23 | –1.04 | –1.87 | –1.96 |
| | (.36) | (.0006) | (.0001) | (.0004) |

Each firm has an individual ERC as outlined in Table 2. ERCs for levels models are subtracted from the ERC of the corresponding changes model to give $C\tau$–$L\tau$. The sample is split into firms whose earnings are deemed to approximate a random walk, i.e., those who are continuously in profit over the sample period, and those which have substantial transitory components in their earnings, i.e., those which suffer at least one loss during the period. The mean of the difference between the ERC of the levels and changes models is computed for each subsample.
Significance levels based on standard *t*-tests are in parentheses.

are more transitory. In order to investigate this further, the empirical version of the combined model, equation (9) below, is estimated.

$$\frac{P_{it}}{P_{it-\tau}} - 1 = \alpha_0 + \sum_{i=2}^{N} \alpha_i \lambda_i + \sum_{t=2}^{T} \alpha_t \lambda_t + \sum_{i=1}^{N} \beta_i \lambda_i \frac{x_{it}}{MV_{t-\tau}} + \sum_{i=1}^{N} \gamma_i \lambda_i \frac{\Delta x_{it}}{MV_{t-\tau}} + e_{it} \qquad (9)$$

The notation for equation (9) corresponds to that of (8).

Table 5 reports the results of estimating the models based on equation (9) for the profits (Panel A) and losses (Panel B) subsamples. Contemporaneous return–earnings regressions and those that include leading returns are estimated. Here the average ERC is estimated as the sum of the average estimates of β and γ. For example, the average ERC for the profits subsample, estimated using a contemporaneous model, is 5.6. As expected, the average ERCs estimated for the profits subsample are invariably greater than those of the corresponding model for the losses subsample. This positive association between ERC and persistence is consistent with prior literature.

As predicted, the results are not consistent with H3. Thus, a book value valuation model does not underpin the levels variable in the combined model. The alternative interpretation is that significant coefficients for both β and γ may indicate significant measurement error in both proxy variables for unexpected earnings (Brown *et al.*, 1987, p. 164). This errors-in-variables interpretation is consistent with the coefficients outlined in Table 5 and leads to some interesting conclusions. A priori, a greater errors-in-variables problem is expected in the contemporaneous regressions. Both the levels and changes variables are significant here. However, when leading returns are included in the dependent variable, only the average coefficient on the levels variable is significantly different from zero. This, coupled with the finding that the β is greater than γ in all four regressions, is evidence that the levels variable is the primary explanatory variable for returns. The changes variable is

TABLE 5

REGRESSION ESTIMATES FOR COMBINED MODELS, WHERE $\tau = 1$ OR 2

Contemporaneous model ($\tau = 1$)

$$P_{it}/P_{it-1} - 1 = \alpha_0 + \Sigma\alpha_j\lambda_j + \Sigma\alpha_t\lambda_t + \Sigma\beta_j\lambda_j(x_{it}/MV_{it-1}) + \Sigma\gamma_j\lambda_j(\Delta x_{it}/MV_{it-1}) + e_{it}$$

Model with leading returns ($\tau = 2$)

$$P_{it}/P_{it-2} - 1 = \alpha_0 + \Sigma\alpha_j\lambda_j + \Sigma\alpha_t\lambda_t + \Sigma\beta_j\lambda_j(x_{it}/MV_{it-2}) + \Sigma\gamma_j\lambda_j(\Delta x_{it}/MV_{it-2}) + e_{it}$$

| | Contemporaneous | | Leading returns | |
|---|---|---|---|---|
| | $\beta$ | $\gamma$ | $\beta$ | $\gamma$ |
| **Panel A: Profits subsample** | | | | |
| Average coefficient | 3.9** | 1.7** | 7.4** | −0.25 |
| *SD* | 3.04 | 4.4 | 4.7 | 7.2 |
| Median coefficient | 3.6 | 1.3 | 7.07 | −0.6 |
| $R^2$ | | 41.2 | | 68.8 |
| Adj-$R^2$ | | 24.4 | | 59.8 |
| **Panel B: Loss subsample** | | | | |
| Average coefficient | 1.2** | 0.9* | 3.9** | −0.2 |
| *SD* | 2.0 | 2.4 | 3.1 | 3.2 |
| Median coefficient | 1.2 | 0.6 | 3.4 | −0.3 |
| $R^2$ | | 45.6 | | 61.0 |
| Adj-$R^2$ | | 29.6 | | 49.5 |

* significant at 5%, ** significant at 1%.
Overlapping returns are used when $\tau > 1$.
The average slope coefficient for the levels variable ($\beta$) is significantly different from that of the changes variable ($\gamma$) in three of the four cases outlined above. The average $\beta$ and $\gamma$ that are not significantly different from each other are in the contemporaneous model estimated using the loss subsample.

significant only where it helps mitigate the errors-in-variables problem. When leading prices are allowed into the model, the errors-in-variables problem is no longer relevant, and the levels variable alone is sufficient to estimate the ERC.[7]

## SUMMARY AND CONCLUSIONS

This study considers three models of the return–earnings relation. The models outlined in equations (1) to (3) use the level of earnings; the change in earnings and both, scaled by beginning of period price, as the independent variable(s) for return. Ohlson (1991) shows analytically that the level of earnings scaled by price is the primary independent variable for return. When earnings follow a strict random walk, the change in earnings scaled by price is an equivalent dependent variable (Ohlson, 1991; Kothari, 1992). The empirical results reported here confirm this. In addition, it is demonstrated, analytically and empirically, that when earnings follow a mixed process with both permanent and transitory components, ERCs differ between levels and changes models. It is also shown that there is a positive relation between the ratio of the change in permanent earnings to the change in total earnings and the excess of the ERC estimated by the changes model over that estimated by the levels model.

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[7] The regressions reported in Table 5 use overlapping data and inferences are based on OLS, whose assumptions are likely to be violated. Accordingly, the analysis was repeated on two subsamples, using odd and even years, of non-overlapping data and inferences based on heteroskedasticity-consistent standard errors (see White, 1980). The results, which are not reported here, are consistent with those reported above.

The overall conclusions with regard to the three models outlined in equations (1)–(3) are: first, consistent with Ohlson (1991), the levels variable appears to be the primary earnings variable for explaining returns; second, the changes *model* is useful as an approximation for firms whose earnings approach a random walk; and third, the changes *variable* has a meaningful role in the combined model only when the errors-in-variables problem, associated with measuring unexpected earnings, is not addressed in an alternative way.

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## APPENDIX

Previous studies have used equation (7) as a time series estimate of earnings persistence (e.g., O'Hanlon *et al.*, 1992, p. 629). To estimate (7) an ARIMA (2,1,0) process and $r = 10\%$ are assumed.[8] This process can be used to explain why $\Delta x_t^P/\Delta x_t^T$ is proxied by (7). The change in earnings in an ARIMA (2,1,0) model is:

$$\Delta x_t = \phi_1 \Delta x_{t-1} + \phi_2 \Delta x_{t-2} + e_t$$

This can be split into the change in permanent earnings $\Delta x_t^P$ and transitory earnings $\Delta x_t^T$:

$$\Delta x_t^P = \phi_1^P \Delta x_{t-1}^P + \phi_2^P \Delta x_{t-2}^P + e_t$$

$$\Delta x_t^T = \phi_1^T \Delta x_{t-1}^T + \phi_2^T \Delta x_{t-2}^T + e_t$$

$\phi^P$ will be larger than $\phi^T$. $\phi_j$ will be a weighted average of $\phi_j^P$ and $\phi_j^T$ with the weights determined by the relative sizes of $\Delta x^P$ and $\Delta x^T$. So the larger $\Delta x^P/\Delta x$ the larger $\phi_j$ and consequently (7).

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[8] Using this model for all companies resulted in six outliers. Equation (7) was re-estimated for these companies using either ARIMA (1,1,0) or ARIMA (0,1,1) as appropriate.

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ALFRED LYE CHYE LOH AND TIN HOE TAN

# Asset Write-Offs—Managerial Incentives and Macroeconomic Factors

The objective of this study is to explain what firm-specific and macroeconomic factors are likely to influence the asset write-off decision in Singapore, where upward revaluations, unlike in the U.S., are also permitted. The focus is on write-offs relating to two main asset categories, namely, fixed assets and long-term investments. Data on seventy-eight firms listed on the Stock Exchange of Singapore Mainboard were collected from 1983 to 1997. Results of cross-sectional and time-series analyses identify relevant macroeconomic factors to be unemployment rate, GDP growth rate and occupancy rate of properties, and firm-specific factors to be profitability and a change of board chairman.

**Key words**: Fixed assets; Investment; Macroeconomics; Write-off.

Investors rely on analysts' forecasts to gain a better understanding of a firm's future prospects when formulating their investment strategies. However, these forecasts often deviate significantly from firms' reported results due to, *inter alia*, unexpected write-offs. An example is the operating results announced by the listed DelGro group and reported in the *Business Times* of 27 March 1998. The group had announced a 26 per cent fall in 1997 net profit to about $49 million (one-third below the market expectation of $72 million), following provisions for 'potential losses in development projects' of about $20 million, and for 'diminution in values of investments' of about $14 million. The press report further suggested that without the provision, the group's profit would have been close to analysts' expectations. This phenomenon was more pronounced during the 1997–8 Asian economic crisis. Firms were found to make more write-offs and often of such unusually high magnitude that they resulted in materially lower profits or even losses being reported. The *Strait Times*' report of 1 April 1998 pointed out that of the 187 firms with financial year ending 31 December 1997, ninety-one made lower profits while twenty-four suffered losses, and that many of the losers raked up huge provisions that overturned what might have been otherwise a profitable performance.

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To gain a better understanding of the reported results of the firms, it is argued that the incentives that motivate managers to write down[1] their firms' assets should be explicated, so that the wealth effects of their decisions can be understood. Several studies, for example, Brown *et al.* (1992) and Whittred and Chan (1992) examined why Australian firms undertake upward revaluations. An upward revaluation refers to the restatement of the asset's book value (carrying amount) to a higher value, in contrast to an asset write-off. Such upward revaluations have been commonplace in Australia, although a revaluation by itself has no obvious direct effect on the firm's cash flows, except for the cost of undertaking and recording the revaluation. These Australian studies find that economic forces partially explain the decision to revalue assets. Further, a U.S. study by Rees *et al.* (1996) suggests that write-downs are an appropriate response by managers to changes in the firm's economic environment, rather than being associated with managers' opportunistic behaviour.

The study examines the issue of downward revaluations, which are not addressed by Australian studies,[2] although other studies have looked at this issue from the U.S. perspective. Unlike the U.S. studies, this work examines the factors that may influence fixed asset and long-term investment write-offs undertaken by firms in Singapore, where upward asset revaluations (as in Australia) are also permitted. Following an upward revaluation, there is a greater likelihood that the carrying amount of the revalued asset may exceed its recoverable amount in the future. The implication is more frequent write-offs, and probably write-offs of higher magnitude, are more likely to be observed in countries where accounting standards permit upward revaluations. Under such circumstances, the factors that influence a firm's asset write-off decision are likely to differ from those identified in the U.S. studies. The current study examines both managerial incentives and macroeconomic factors that might influence a firm's decision to write-off some assets. An understanding of these factors could help analysts and other financial statement users identify the periods in which a write-off is more likely to occur, and may possibly yield additional insights into the factors that might influence the upward revaluation decision.

## BACKGROUND AND HYPOTHESES

The relevant Statements of Accounting Standard (SAS) on fixed assets and long-term investments write-offs are SAS 14 (*Property, Plant and Equipment*) and SAS 25 (*Accounting for Investments*). Under these standards, the assets can be recorded at historical cost or at a revalued amount, which can result from either an upward revaluation or a devaluation. The write-off effect on the reported profit of a Singaporean firm depends on how the write-off is accounted for. It can be taken directly to the profit and loss statement, where it is reported as an expense, or as an exceptional or extraordinary item. Alternatively, it can be reported 'below the line', as a debit to the profit and loss appropriation account or to a reserve account. Under the first method, the reported profit in that year is reduced (though it may not necessarily reduce operating profit). The second and third methods have no direct effect on the 'bottom line' in the write-off year.[3] A write-off could have a significant impact on the firm's financial ratios as well. Since it reduces the book values of assets and shareholders' equity, the timing and amount of a write-off will at least affect all the financial ratios involving assets or in their shareholders' equity calculation.

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[1] The terms 'write-off' and 'write-down' are used interchangeably here to refer to the writing down of the carrying amount of the asset to its recoverable amount.

[2] Asset write-offs in Australia were the subject of Chia (1995), discussed below.

As with the case of an upward revaluation, there are costs associated with undertaking an asset write-off. Firms that make asset write-offs may have to pay higher audit fees because of the extra audit work involved (Goodwin and Trotman, 1993).[4] The extra audit work includes investigating the validity of any write-off and discussions with the directors and management involved. Since the write-off of an asset changes the firm's financial profile and involves costs, managers are therefore not indifferent to how and when they write off their firms' assets.

### *Asset Write-Offs and Managerial Incentives*

*1: Management compensation plans* Management compensation packages are usually related, whether directly or indirectly, to performance measures such as accounting earnings or the rate of return (Emmanuel *et al.*, 1990; Hay, 1991). Managers with bonus plans often make accounting choices that increase income (Healy, 1985; Christie, 1990; Gaver *et al.*, 1995; Holthausen *et al.*, 1995).[5] Elliott and Shaw (1988), Zucca and Campbell (1992), Wolcott (1993) and Chia (1995), among others, find that firms that write off their assets are less profitable, or have earnings that are below expectation, or have lower returns on assets and equity in the write-down year, when compared to non-write-down firms.

Heflin and Warfield (1997) find that managers tend to postpone a write-off to the year they report poor earnings. A plausible explanation for write-offs exacerbating poor profit performance may be investor pessimism at the time. Pessimistic investors may anticipate more bad news. Thus, opportunistic managers may have an incentive to 'take a bath' by making a major asset write-off (Zucca and Campbell, 1992). A write-off will result in a decrease in future depreciation expense, and may also allow for the possibility of a future write-back. A write-off now would result in an increase in future returns on assets and equity of the firm, which may in turn lead to higher future compensation for the manager. Deng and Lev (1998) argue that acquiring firms immediately write off the R&D-in-process costs of their target firms for this reason.[6]

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[3] However, depreciation charges for the year would be lower if a write-off involves a depreciable asset written off during the year. It is believed that the majority of the write-offs are likely to be undertaken at the end-of-year.

[4] Turpen (1995) reports that the size and complexity of the firm, its industry group and additional measures of auditor exposure are determinants of the variability in audit fees. Large diversified firms with extensive receivables and inventories, or firms that experience financial difficulty or ultimately receive a qualified audit opinion, pay more for their audits.

[5] There are costs as well as benefits to increasing income. Balsam (1998) makes the obvious point that managers select income-increasing accounting procedures only when the benefits exceed the costs.

It may also be argued that an asset write-off may help resolve problems caused by information asymmetries, in that insider-managers can signal important information which they hold, by writing down the assets they manage. While an upward revaluation may be used to signal better future performance (Aboody *et al.*, 1999), the manager may write down assets in times of poor earnings, to signal that past problems are being dealt with. Aboody *et al.* find that upward revaluations of fixed assets by U.K. firms are significantly positively related to future firm performance. Also, current year revaluations (revaluation balances) are significantly positively related to annual returns (prices),[7] indicating that revaluations reflect asset value changes. They also find that downward revaluations are significantly positively related to returns, but small (large) downward revaluations are insignificantly (significantly negatively) related to future performance. On the other hand, Heflin and Warfield (1997) find that firms' write-down-year annual stock returns are negatively correlated with the magnitude of write-offs, and that the market may have already incorporated the lower values of the firms' assets in its assessment up to three years before the firm takes a write-off. It is conjectured that the SEC's ban on upward revaluations of assets in the U.S., in contrast to U.K. accounting standards, might partly explain the differing results.

Discretionary write-offs are often associated with a change in top management, and usually are accompanied by a decrease in income in the year the change occurred (Bernstein, 1970; Moore, 1973). Strong and Meyer (1987) find that a change in senior management is the most important factor that determines a write-off decision. Lower income often results from the new management providing for future restructuring costs and losses, or undertaking more frequent or larger write-offs (Elliott and Shaw, 1988; Chia, 1995; Francis *et al.*, 1996).[8] Some explanations that have been suggested for this behaviour are: (a) to 'clear the decks' of impaired assets, so as to improve investors' perceptions of the future financial performance of the firm, since future costs will be lower after the write-off; (b) to change the strategic focus of the firm (Francis *et al.*, 1996); or (c) to lay the 'accounting foundations' for future years to show an increase in reported income (Foster, 1986, p. 227). By undertaking these actions, the new management might anticipate being rewarded with higher performance-linked compensation in the future.

The above discussion prompts two related hypotheses:

H1: The frequency and magnitude of write-offs are inversely related to the profitability of the firm (before any write-off).

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[6] This practice has been under intense regulatory scrutiny in recent years.

[7] Return is the firm's year $t$ share return, where year $t$ is the year of the revaluation. It is measured from three months after the year-end for year $(t - 1)$ to three months after the year-end for year $t$.

[8] Fried *et al.* (1989) and Wolcott (1993) observe no positive relation between the write-off decision and a change in management.

H2: The frequency and magnitude of write-offs are positively related to a change in top management.

*2: Debt contracting* It has been found in the U.S. that write-downs tend to happen more frequently when a firm's debt-to-asset ratio declines from the previous year (Strong and Meyer, 1987). Also, the write-off firms generally have lower debt-to-equity ratios than their non-write-off counterparts (Zucca and Campbell, 1992). Chia (1995) finds some support for the proposition that Australian firms with high leverage are less likely to make property (or fixed asset) write-offs. One plausible argument is that financial leverage, as measured by the debt-to-asset ratio, is an important determinant of the financial risk of a firm. A firm with a higher debt-to-asset ratio may therefore be less likely to write off assets, to avoid a further deterioration in the debt-to-asset ratio and higher borrowing costs.[9]

H3: The frequency and magnitude of write-offs are inversely related to the firm's debt-to-asset ratio (before any write-off).

Highly leveraged firms with debt covenants in place may be even more reluctant to book a write-off, although a study by Wolcott (1993) finds only limited evidence that write-downs are delayed to avoid violation of debt covenants. Debt covenants usually restrict the amount of debt issued and specify a maximum debt ratio. Violation of a debt covenant will impose refinancing and restructuring cost on the violation (Beneish and Press, 1993). This issue is not examined here, as it was not feasible to obtain specific debt contract information.

### *Asset Write-Offs and Macroeconomic Factors*

A write-off of an asset refers to the writing down of the carrying amount of the asset to its recoverable amount. The recoverable amount will be affected by prevailing macroeconomic conditions, which therefore would affect the likelihood of a firm undertaking an asset write-off. Thus Chia (1995) finds that firms make larger property write-offs during an economic downturn and more frequently when property vacancy rates are higher (Carn *et al.*, 1988). In particular, she finds that investment write-offs are influenced by share market conditions and company profitability, while aggregate write-offs are best predicted by the property vacancy rate. On a similar note, Rees *et al.* (1996) have suggested that write-downs are an appropriate response by management to changes in the firm's economic environment, rather than being associated with managers' opportunistic behaviour.

Six macroeconomic factors are identified and discussed separately under the two main categories of asset write-offs, namely, fixed assets (FA) and investments (INV). Also a composite category (ALL)[10] is derived to capture the less frequent write-offs relating to trademarks, patents and deferred expenditures, as well as for fixed assets and investments.

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[9] For upward revaluations, Aboody *et al.* (1999) find that the relations between revaluations and future performance and prices are weaker for higher debt-to-equity ratio firms, indicating motivation affects how revaluations reflect fundamentals.

[10] The explanatory variables for INV write-offs are applicable to this composite category.

*1: Fixed assets* Fixed assets include property, plant and equipment. Economic theory and practical industry insights suggest their values are likely to be affected by changes in interest rates and in aggregate economic activity, as measured by gross domestic product (GDP). *Ceteris paribus*, asset values tend to be lower when interest rates are higher. This may increase the likelihood of the carrying amount of these assets being higher than their recoverable amount, and create the need to write down their book values. The demand for fixed assets is expected to be more buoyant during periods of economic growth. It will be more depressed when the economy is in recession, in which case asset prices will be lower. This may increase the likelihood of the carrying amount being higher than the recoverable amount, as well as the need to write down the book value. For these reasons, Chia (1995) finds the property (or fixed asset) write-off decision in Australia to be negatively correlated with the business cycle.

A material component of a typical firm's fixed assets are property. Hence, it is important to consider factors that influence property values. Besides GDP and interest rate factors, property values are directly influenced by the supply and demand conditions prevailing in the specific property market. A leading indicator of the market price (and the need for new construction) is the vacancy rate for property (Carn *et al.*, 1988). The lower the occupancy rate, the higher is the short-term excess supply of property and the lower are the property values. This may increase the likelihood of the carrying amount of these assets being higher than the recoverable amount, as well as the need to write down the book values of these assets. Chia (1995) finds that property write-offs are more likely to occur when the property vacancy rate is higher. Besides the property vacancy rate, the stock price performance of property firms may provide another indication of the prevailing market sentiment for property.

Although a material component of a firm's fixed assets is held in property, write-offs of property are usually labelled, in the financial statements of the reporting entity, as 'fixed asset write-offs' and not disclosed in a separate category. As such, an analysis of property write-offs cannot feasibly be conducted. Thus:

H4: The frequency and magnitude of fixed asset write-offs are inversely related to the GDP growth rate, property occupancy rate and stock price performance of property firms, and positively related to the rate of change in interest rates.

*2: Investments* Long-term share investments are considered, as well as investments in associated companies and joint ventures. As with fixed assets, investment value is predicted to be inversely related to interest rates and directly related to growth in GDP. Two other relevant macroeconomic factors are the unemployment rate and the state of the share market in general. The unemployment rate is a key indicator of the economy's health. It reflects the unused capacity in the work force and has a direct effect on firms' demand for goods and services, which in turn affects investment values. An increase in the unemployment rate typically leads to a drop in aggregate savings and a lower demand for investment (Hughes *et al.*, 1992). This, in turn, may result in a decline in investment values. The state of the share market tends to influence the investment write-off decision (Chia, 1995). The current market assessment of investors is reflected in the general movements in the share prices of all listed firms. A decline in the general stock market index may suggest a likely drop in investment values.

H5: The frequency and magnitude of investment write-offs are inversely related to the GDP growth rate and the rate of change in the general stock market index, and positively related to the rate of change in both interest rates and the unemployment rate.

## RESEARCH DESIGN

The study covers a period of fifteen years (from 1983 to 1997). Of the entire sample of ninety-five firms that are incorporated in Singapore and listed on the SES Mainboard as at 1 January 1983, seventeen are omitted as they were in the financial sector or because of non-availability of data, leaving seventy-eight firms in the sample. With eight of these subsequently acquired or delisted, the sample size is further reduced, over time, to seventy in 1997.

Statistical analysis is performed on both the individual year (cross-sectional and time series, to control for any year effects and fixed firm effects, respectively) and the pooled sample of all years, to enhance estimation precision. Industry classification is also introduced to control for industry-specific factors that may influence the write-off decision. The classifications are: Commerce, Hotel/Restaurant, Manufacturing, Multi-Industry, Property, and Others (services, storage, communications and construction).[11]

## VARIABLE DEFINITIONS

Table 1 tabulates the definitions of the explanatory variables and their predicted relationships with the write-off decision. The macroeconomic variables are listed first, then the firm-specific variables.

The proxy for the business cycle is the rate of change in GDP from the previous year, ΔGDP. GDP has been used to measure overall economic activity in many studies (Case and Fair, 1996). The interest rate proxy is measured as the rate of change in the average prime rate (quoted by the ten leading Singapore banks) from the previous year, ΔINTEREST. The prime rate is selected as this is closely correlated with the rates banks would charge for property loans. The proxy for stock price performance of property firms (to capture the prevailing market sentiment for property) is the rate of change in the Stock Exchange of Singapore [SES] All-Property Index from the previous year, ΔSES ALL-PROP, while in the case of the state of the share market we use the rate of change in SES All-Singapore Index

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[11] There are three reasons for controlling for industry factors. First, accounting practices are often observed to reflect industry commonalities. For example, the accounting treatment of inventory is clustered by industry (Foster, 1986). Second, firms in the same industry tend to use the same technology, thus they face the same pressure from technological change. One firm's write-offs could be symptomatic of pressures on other firms in the industry (Wolcott, 1993). Third, firms' financial profiles cluster by industry (Foster, 1986).

TABLE 1

VARIABLE DEFINITIONS

| Explanatory variable | Measured as | Denoted by | Expected relation |
|---|---|---|---|
| Macroeconomic variables | | | |
| Rate of change in GDP | $(GDP_t - GDP_{t-1}) / GDP_{t-1}$ | ΔGDP | – |
| Rate of change in interest rate | $(Interest_t - Interest_{t-1}) / Interest_{t-1}$ | ΔINTEREST | + |
| Rate of change in SES All-Singapore Index | (SES All-S'pore $Index_t$ – SES All-S'pore $Index_{t-1}$) / SES All-S'pore $Index_{t-1}$ | ΔSES ALL-SPORE | – |
| Rate of change in SES All-Property Index | (SES All-Property $Index_t$ – SES All-Property $Index_{t-1}$) / SES All-Property $Index_{t-1}$ | ΔSES ALL-PROP | – |
| Average occupancy rate[a] | (Total occupancy rates of Private Residential Units, Office, Shop, Factory and Warehouse Space) / 5 | OCCUP | – |
| Rate of change in unemployment rate | (Unemployment $rate_t$ – Unemployment $rate_{t-1}$) / Unemployment $rate_{t-1}$ | ΔUNEMPLOY | + |
| Firm-specific variables | | | |
| Return on assets | Profit (adjusted for any write-off) / Total assets (adjusted for any write-off) | ROA | – |
| Debt-to-asset ratio | Total liabilities / Total assets (adjusted for any write-off) | D/A | – |
| Change in chairman | 1 if change in chairman, 0 otherwise | ΔCH | + |
| Change in managing director | 1 if change in managing director, 0 otherwise | ΔMD | + |

[a] Data available only from 1985.

from the previous year, ΔSES ALL-SPORE. The vacancy rate, a leading indicator of the market price for property (Carn *et al.*, 1988), is measured as the average occupancy rate of different types of properties, OCCUP. Regressions that involved the OCCUP variable are estimated over a shorter estimation period 1985–97, as the data for this variable are available only from 1985. The unemployment rate, an important indicator of aggregate savings and demand for investment, and in turn investment values (Hughes *et al.*, 1992), is measured as the rate of change in the unemployment rate from the previous year, ΔUNEMPLOY.

For the profitability of a firm (that is, a firm-specific variable), the proxy is its return on assets (ROA), measured as profit (before any write-off) divided by total assets (also before any write-off). The proxy used for financial leverage is the firm's debt-to-asset ratio (D/A). It is calculated as the ratio of total liabilities to total assets (before any write-off). A dichotomous variable captures whether or not a firm changes its managing director (ΔMD)[12] or board chairman (ΔCH).

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[12] 'Managing director' includes the 'chief executive officer' or a similar title.

## RESULTS

### *Data Profile Analysis*

Table 2 shows the frequency and magnitude (both mean and median) of write-offs by year (fifteen-year period) and by asset category. The frequency and magnitude of write-offs (in all three categories), as well as the frequency for investment (INV) write-offs, and magnitude for fixed assets (FA) and all (ALL) write-offs, are significantly higher in 1997, and in 1985 and 1986, respectively, than in other years. The year 1997 coincides with the regional Asian economic crisis, while 1985 and 1986 coincide with an economic downturn in the local economy, which is reflected in firm profitability (ROA; see Table 3). For debt to assets (D/A), the mean and median are generally stable across the years. The remaining two variables ΔCH (the change of board chairman) and ΔMD (the change of managing director) do not display any discernible trend over time. Simple correlation tests do not reveal any obvious multicollinearities between the variables.

### *Cross-Sectional Model (Logistic/Tobit Regression)*

The two dependent variables, frequency of write-offs and magnitude of write-offs, are regressed against the firm-specific variables for each year. For brevity, we present only a summary of the results, in terms of the number of years the expected sign is either correctly predicted or is significant (details are in Table 4). For both the logistic and tobit regression results,[13] a stronger association (in term of the number of years the expected sign is correctly predicted) is observed for ΔCH, ROA and ΔMD than for D/A. The findings are consistent with studies cited earlier, which have suggested that management change and profitability are important determinants of the write-off decision.

### *Time-Series Model (OLS Regression)*

The dependent variables (frequency of write-offs and magnitude of write-offs) are regressed against the macroeconomic variables, using ordinary least squares (OLS) and the Cochrane and Orcutt method.[14] The results are, however, not noticeably different between the two methods.[15] Consequently, only the Cochrane and Orcutt results are presented in Table 5.

As with Chia (1995), firms were found to make larger property (FA) write-offs during an economic downturn while investment (INV) write-offs are influenced by share market movements—as indicated by the significant results obtained for the

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[13] Of the fifteen logistic regressions for each category, the number of regressions that are significant ($p \leq 0.10$), by category, are as follows: 8 (FA), 7 (INV) and 11 (ALL). For the tobit regressions, the explanatory power, $R^2$, ranges, from 0.06 to 0.95. The results also show that both frequency and magnitude of write-offs differ significantly across industries.

[14] The latter method is employed as the Durbin–Watson test performed on all the regressions yields inconclusive results (at the 0.05 significance level) for either positive or negative autocorrelation.

[15] Five of the six OLS regressions are significant ($F$-test: $p \leq 0.10$).

TABLE 2

FREQUENCY AND MAGNITUDE OF WRITE-OFFS BY SINGAPOREAN FIRMS, 1983–97
(MEASURED IN 1990 MARKET PRICES, IN THOUSAND DOLLARS), BY YEAR AND ASSET CATEGORY

| | | Fixed assets (FA) | | | | | Investments (INV) | | | | | All assets (ALL) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | *N*[a] | W[b] | P[c] | Mean | Median | *SD* | W | P | Mean | Median | *SD* | W | P | Mean | Median | *SD* |
| 1983 | 78 | 14 | 0.18 | 219.6 | 106.1 | 317.4 | 13 | 0.17 | 615.5 | 197.7 | 879.0 | 29 | 0.37 | 489.2 | 188.3 | 692.2 |
| 1984 | 75 | 12 | 0.16 | 12589.1 | 40.4 | 39057.3 | 21 | 0.28 | 1044.9 | 280.0 | 1252.9 | 32 | 0.43 | 5342.1 | 228.0 | 24903.8 |
| 1985 | 75 | 16 | 0.21 | 11720.7 | 738.0 | 22660.1 | 29 | 0.39 | 1192.9 | 639.2 | 1787.1 | 37 | 0.49 | 5963.7 | 806.2 | 15474.2 |
| 1986 | 75 | 19 | 0.25 | 8951.3 | 614.4 | 19493.0 | 25 | 0.33 | 3381.5 | 1054.2 | 5947.6 | 33 | 0.44 | 7947.5 | 1949.0 | 15861.9 |
| 1987 | 73 | 22 | 0.30 | 2462.9 | 382.6 | 5779.3 | 16 | 0.22 | 1844.1 | 456.7 | 3329.9 | 35 | 0.48 | 2458.4 | 474.5 | 5731.9 |
| 1988 | 72 | 17 | 0.24 | 256.2 | 117.5 | 280.6 | 13 | 0.18 | 2204.8 | 1113.3 | 3504.3 | 28 | 0.39 | 1377.0 | 565.4 | 2603.4 |
| 1989 | 71 | 19 | 0.27 | 143.8 | 67.2 | 161.7 | 10 | 0.14 | 3154.6 | 1868.4 | 4168.9 | 33 | 0.46 | 1201.1 | 159.0 | 2728.2 |
| 1990 | 71 | 18 | 0.25 | 299.8 | 107.0 | 477.9 | 20 | 0.28 | 7751.7 | 1606.0 | 19422.1 | 37 | 0.52 | 4354.3 | 405.0 | 14775.1 |
| 1991 | 71 | 26 | 0.37 | 1384.9 | 240.8 | 4959.0 | 21 | 0.30 | 6898.7 | 1632.5 | 14363.4 | 41 | 0.58 | 4438.1 | 362.7 | 11491.1 |
| 1992 | 71 | 22 | 0.31 | 611.3 | 350.4 | 885.6 | 24 | 0.34 | 7477.4 | 1166.6 | 14519.8 | 45 | 0.63 | 4470.5 | 449.1 | 11294.5 |
| 1993 | 71 | 20 | 0.28 | 452.3 | 307.4 | 510.3 | 19 | 0.27 | 1675.7 | 693.1 | 2309.1 | 39 | 0.55 | 1224.5 | 546.2 | 1795.5 |
| 1994 | 71 | 24 | 0.34 | 1529.1 | 163.1 | 4448.6 | 19 | 0.27 | 2822.0 | 1156.3 | 3716.2 | 42 | 0.59 | 2761.7 | 531.9 | 5540.5 |
| 1995 | 71 | 20 | 0.28 | 581.5 | 307.6 | 792.8 | 18 | 0.25 | 1167.5 | 706.8 | 1212.6 | 37 | 0.52 | 981.0 | 326.1 | 1191.3 |
| 1996 | 71 | 25 | 0.35 | 2086.6 | 259.0 | 6576.0 | 20 | 0.28 | 4718.4 | 979.6 | 9144.7 | 42 | 0.59 | 4380.7 | 627.1 | 11929.3 |
| 1997 | 70 | 31 | 0.44 | 2469.1 | 501.1 | 4649.7 | 25 | 0.36 | 14980.2 | 6817.1 | 29788.5 | 47 | 0.67 | 13501.8 | 1806.5 | 35353.3 |

[a] Number of firms in a given year.
[b] Number of firms that make a write-off in a given year.
[c] Proportion of firms that makes a write-off in a given year.

Table 3

FIRM-SPECIFIC VARIABLES FOR SINGAPOREAN FIRMS, 1983–97, BY YEAR

| | Return-on-assets (ROA) | | | Leverage (D/A) | | | Change in chairman ($\Delta$CH) | | Change in managing director ($\Delta$MD) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | Mean | Median | *SD* | Mean | Median | *SD* | *N*[a] | P[b] | *N* | P |
| 1983 | 0.067 | 0.050 | 0.068 | 0.346 | 0.317 | 0.174 | 9 | 0.115 | 6 | 0.077 |
| 1984 | 0.038 | 0.034 | 0.079 | 0.379 | 0.348 | 0.201 | 14 | 0.187 | 13 | 0.173 |
| 1985 | 0.013 | 0.017 | 0.053 | 0.376 | 0.354 | 0.187 | 11 | 0.147 | 9 | 0.120 |
| 1986 | 0.017 | 0.022 | 0.065 | 0.374 | 0.358 | 0.211 | 7 | 0.093 | 11 | 0.147 |
| 1987 | 0.029 | 0.031 | 0.066 | 0.388 | 0.397 | 0.213 | 10 | 0.137 | 16 | 0.219 |
| 1988 | 0.044 | 0.043 | 0.060 | 0.367 | 0.357 | 0.197 | 6 | 0.083 | 6 | 0.083 |
| 1989 | 0.051 | 0.046 | 0.056 | 0.366 | 0.367 | 0.178 | 7 | 0.099 | 7 | 0.099 |
| 1990 | 0.067 | 0.055 | 0.057 | 0.346 | 0.334 | 0.169 | 9 | 0.127 | 8 | 0.113 |
| 1991 | 0.054 | 0.045 | 0.053 | 0.373 | 0.362 | 0.167 | 6 | 0.085 | 15 | 0.211 |
| 1992 | 0.058 | 0.043 | 0.063 | 0.396 | 0.405 | 0.173 | 9 | 0.127 | 7 | 0.099 |
| 1993 | 0.055 | 0.040 | 0.062 | 0.381 | 0.374 | 0.165 | 7 | 0.099 | 13 | 0.183 |
| 1994 | 0.064 | 0.046 | 0.079 | 0.368 | 0.357 | 0.169 | 7 | 0.099 | 9 | 0.127 |
| 1995 | 0.050 | 0.040 | 0.058 | 0.365 | 0.351 | 0.179 | 8 | 0.113 | 9 | 0.127 |
| 1996 | 0.050 | 0.046 | 0.070 | 0.400 | 0.407 | 0.177 | 12 | 0.169 | 14 | 0.197 |
| 1997 | 0.036 | 0.030 | 0.059 | 0.418 | 0.414 | 0.161 | 8 | 0.114 | 10 | 0.143 |

[a] Number of firms that experience a change in management in a given year.
[b] Proportion of firms that experiences a change in management in a given year.

two corresponding variables, $\Delta \mathrm{GDP}_{\mathrm{magnitude}}$[16] for fixed assets (FA) write-offs and $\Delta \mathrm{SES}_{\mathrm{frequency}}$ for investment (INV) write-offs, respectively. The other variables that are significant include: (a) $\Delta \mathrm{GDP}_{\mathrm{magnitude}}$ and $\Delta \mathrm{UNEMPLOY}_{\mathrm{frequency}}$ for investment (INV) write-offs; and (b) $\Delta \mathrm{UNEMPLOY}_{\mathrm{frequency/magnitude}}$ and $\mathrm{OCCUP}_{\mathrm{magnitude}}$ for all (ALL) write-offs. These results seem to suggest that, in general, the macroeconomic factors are more important determinants of the frequency of write-offs of investments than of property. Besides the fact that investment values are readily influenced by movements in these factors, management may have less discretion in deciding whether or not to write down the values of the investment assets, particularly where those values are readily observed.

### *Pooled Model (Logistic/Tobit Regression)*

To improve estimation precision, the data are pooled across all years and the dependent variables (frequency and magnitude of write-offs) are regressed against both the firm-specific and the macroeconomic variables. The results are presented in

---

[16] The subscript refers to the dependent variable (frequency or magnitude of write-offs) for the associated asset write-offs category (FA, INV or ALL).

TABLE 4

SUMMARY OF LOGISTIC AND TOBIT REGRESSION RESULTS (CROSS-SECTIONAL MODEL) RELATING MAGNITUDE AND FREQUENCY OF WRITE-OFFS TO FIRM SPECIFIC VARIABLES

| | | Logistic regressions[a] | | | | | | Tobit regressions[b] | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Fixed assets (FA) | | Investments (INV) | | All assets (ALL) | | Fixed assets (FA) | | Investments (INV) | | All assets (ALL) | |
| Variable[c] | Expected sign | $N_{Correct}$[d] | $N_{Sig}$[e] | $N_{Correct}$ | $N_{Sig}$ | $N_{Correct}$ | $N_{Sig}$ | $N_{Correct}$ | $N_{Sig}$ | $N_{Correct}$ | $N_{Sig}$ | $N_{Correct}$ | $N_{Sig}$ |
| ΔCH | + | 11 | 3 | 3 | 0 | 10 | 1 | 10 | 4 | 7 | 0 | 10 | 3 |
| ΔMD | + | 9 | 0 | 7 | 2 | 7 | 2 | 7 | 1 | 8 | 0 | 8 | 0 |
| ROA | – | 8 | 2 | 9 | 1 | 10 | 2 | 11 | 4 | 11 | 2 | 12 | 5 |
| D/A | – | 7 | 1 | 3 | 0 | 2 | 0 | 7 | 3 | 4 | 0 | 5 | 1 |

[a] The dependent variable is the frequency of the asset write-offs. (It takes the value of '1' if a firm makes a write-off of that asset category, and 0 otherwise.)

[b] The dependent variable is the magnitude of the asset write-offs. (This magnitude is deflated by the value of that asset category [before any write-off].)

[c] ΔCH refers to a change in chairman in a given year.
ΔMD refers to a change in managing director in a given year.
ROA refers to return on assets.
D/A refers to debt-to-asset ratio.

[d] The total number of years in which the coefficient of the variable is found to have the expected sign (maximum is 15).

[e] The total number of years in which the coefficient of the variable is found to be significant (at the 10% level or better).

TABLE 5

OLS REGRESSION RESULTS (TIME-SERIES MODEL) RELATING MAGNITUDE AND FREQUENCY OF WRITE-OFFS TO MACROECONOMIC VARIABLES

| | | Cochrane–Orcutt[a] | | |
|---|---|---|---|---|
| Variable[b] | Expected sign | Fixed assets (FA) | Investments (INV) | All assets (ALL) |
| **Panel A**[c] | | | | |
| ΔGDP | – | –0.924 | –0.329 | –0.181 |
| ΔINTEREST | + | –0.045 | 0.221 | 0.027 |
| ΔSES ALL-PROP | – | 0.110 | NA | NA |
| OCCUP | – | 0.006 | NA | 0.014 |
| ΔUNEMPLOY | + | NA | 0.199** | 0.231*** |
| ΔSES ALL-SPORE | – | NA | –0.089* | 0.218 |
| Constant | | –0.176 | 0.304*** | –0.716*** |
| Adjusted $R^2$ | | 0.133 | 0.543 | 0.941 |
| Number of observations | | 13 | 15 | 13 |
| **Panel B**[d] | | | | |
| ΔGDP | – | –0.054* | –0.540*** | –0.023 |
| ΔINTEREST | + | –0.024 | 0.047 | 0.009 |
| ΔSES ALL-PROP | – | 0.003 | NA | NA |
| OCCUP | – | –0.004 | NA | –0.001*** |
| ΔUNEMPLOY | + | NA | 0.017 | 0.011** |
| ΔSES ALL-SPORE | – | NA | –0.039 | –0.004 |
| Constant | | 0.045* | 0.061*** | 0.127*** |
| Adjusted $R^2$ | | 0.736 | 0.754 | 0.948 |
| Number of observations | | 13 | 15 | 13 |

[a] Cochrane–Orcutt estimator covers the period 1985–97.

[b] ΔGDP refers to the rate of change in GDP.
ΔINTEREST refers to the rate of change in interest rate.
ΔSES ALL-PROP refers to the rate of change in SES All-Property Index.
OCCUP refers to the average occupancy rate.
ΔUNEMPLOY refers to the rate of change in unemployment rate.
ΔSES ALL-SPORE refers to the rate of change in SES All-Singapore Index.

[c] The dependent variable is the asset write-off. (It is defined as the proportion of firms that makes a write-off in a given year.)

[d] The dependent variable is the magnitude of the write-off. (It is defined as the mean, across all firms, of the magnitude of write-off deflated by the value of that asset category [adjusted for any write-off] in a given year.)

*Note*: ***, ** and * indicate that the coefficient is at 0.01, 0.05 and 0.10 significance level, respectively.

Table 6. Logistic regressions for all the three categories are observed to be strongly significant ($p \leq 0.0001$), while the $R^2$ of the tobit regressions ranges from 0.17 to 0.26.

The frequency and magnitude of write-offs differ significantly across industries, and are observed, for *all* write-offs, to be higher in the property sector than in the hotel and restaurant sector. This observation may be due to the common practice

TABLE 6

LOGISTIC AND TOBIT REGRESSION RESULTS (POOLED MODEL) RELATING MAGNITUDE AND FREQUENCY OF WRITE-OFFS TO BOTH FIRM SPECIFIC AND MACROECONOMIC VARIABLES

| | | Logistic regressions[a] | | | Tobit regressions[b] | | |
|---|---|---|---|---|---|---|---|
| Variable[c] | Expected sign | Fixed assets (FA) Logit II[d] | Investments (INV) Logit I[e] | All assets (ALL) Logit II | Fixed assets (FA) Tobit II[d] | Investments (INV) Tobit I[e] | All assets (ALL) Tobit II |
| COM | | 1.814*** | −0.646** | 0.551 | 0.032*** | −0.067*** | 0.000 |
| HTLREST | | 0.161 | −1.194*** | −1.175*** | −0.002 | −0.107*** | −0.018*** |
| MFG | | 1.197*** | −1.027*** | −0.384 | 0.017** | −0.071*** | −0.004 |
| MU | | 0.915** | 0.228 | 0.215 | 0.012 | 0.001 | −0.003 |
| PROP | | 0.794* | −1.035*** | −0.762** | 0.012 | −0.082*** | −0.014*** |
| ΔCH | + | 0.207 | −0.100 | 0.140 | 0.011* | 0.003 | −0.002 |
| ΔMD | + | −0.498 | 0.248 | −0.309 | 0.000 | 0.020 | 0.003 |
| ROA | − | −1.184 | −1.909* | −1.450 | −0.067** | −0.211** | −0.041*** |
| D/A | − | −0.407 | 0.761 | 0.669 | 0.012 | 0.067 | 0.008 |
| ΔGDP | − | −9.529 | −2.211 | 5.037 | −0.076 | −0.287 | −0.073 |
| ΔINTEREST | + | −0.085 | 1.401 | 1.160 | 0.010 | 0.092 | 0.013 |
| ΔUNEMPLOY | + | NA | 0.828* | 1.497 | NA | 0.075* | 0.007 |
| ΔSES ALL-PROP | − | 0.933 | NA | NA | 0.003 | NA | NA |
| OCCUP | − | −0.331** | NA | −0.267* | −0.001 | NA | 0.000 |
| ΔSES ALL-SPORE | − | NA | −0.892 | −0.704 | NA | −0.074 | −0.001 |
| Constant | | 30.347** | −0.474 | 24.937* | 0.037 | −0.055 | 0.015 |
| $\chi^2$ | | 43.55 | 111.19 | 53.48 | | | |
| $P$ | | <0.0001 | <0.0001 | <0.0001 | | | |
| $R^2$ | | | | | 0.170 | 0.199 | 0.255 |
| Number of observations | | 932 | 1086 | 932 | 932 | 1086 | 932 |

[a] The dependent variable is the frequency of the asset write-offs. (It takes the value of 1 if a firm makes a write-off of that asset category, and 0 otherwise.)

[b] The dependent variable is the magnitude of the asset write-offs. (This magnitude is deflated by the value of that asset category [before any write-off].)

[c] COM equals to 1 if the firm belongs to the Commerce sector.
HTLREST equals to 1 if the firm belongs to Hotel/Restaurant sector.
MFG equals to 1 if the firm belongs to Manufacturing sector.
MU equals to 1 if the firm belongs to Multi-Industry sector.
PROP equals to 1 if the firm belongs to Property sector.
ΔCH refers to a change in chairman in a given year.
ΔMD refers to a change in managing director in a given year.
ROA refers to return on assets.
D/A refers to debt-to-asset ratio.
ΔGDP refers to the rate of change in GDP.
ΔINTEREST refers to the rate of change in interest rate.
ΔSES ALL-PROP refers to the rate of change in SES All-Property Index.
OCCUP refers to the average occupancy rate.
ΔUNEMPLOY refers to the rate of change in unemployment rate.
ΔSES ALL-SPORE refers to the rate of change in SES All-Singapore Index.

[d] Both Logit II and Tobit II cover the period 1985–97.

[e] Both Logit I and Tobit I cover the period 1983–97.

*Note*: ***, ** and * indicate that the coefficient is at 0.01, 0.05 and 0.10 significance level, respectively.

of firms in the hotel industry not to revalue hotel assets, and hence they are less likely to have to write them down.[17]

The results again show that profitability is an important determinant of the write-down decision. The ROA variable is strongly related to the magnitude of write-offs across all categories, as well as the frequency of INV write-offs, and its coefficient has the expected sign for $FA_{frequency}$ and $ALL_{frequency}$ write-offs. With two possible exceptions ($\Delta$CH is weakly associated with the magnitude of fixed asset write-offs and the debt-to-assets ratio is likewise weakly associated with the magnitude of investment write-offs) the variables $\Delta$MD, $\Delta$CH and D/A are not significantly related to the frequency or magnitude of write-offs. The results for D/A are thus consistent with Chia (1995), who finds only some support for write-offs being associated with leverage. The findings are also similar to Fried *et al.* (1989) and Wolcott (1993) in that the write-off decision in Singapore appears unrelated to a change in top management.

As with Chia (1995), it was found that firms make more frequent property (FA) write-offs when property vacancy rates are higher, and that (after controlling for industry effects) the frequency of aggregated (ALL) write-offs is best predicted by the property vacancy rate, as indicated by the significant results obtained for the two corresponding variables, $OCCUP_{frequency}$ for fixed assets (FA) and all (ALL) write-offs. In the case of investment (INV) write-offs, the remaining significant variables include $\Delta UNEMPLOY_{frequency}$, similar to the results obtained in the time-series model, and $\Delta UNEMPLOY_{magnitude}$.

*Other Results (OLS Regression)*

Given that a firm has already made a write-off, what would that amount be? To address this question, the OLS regressions are re-estimated by excluding all non-write-off firm-years. Table 7 shows that all the regressions in every category are significant (*F*-test: $p \leq 0.01$).

The results again show that profitability is an important determinant of the magnitude of write-offs. The ROA variable is strongly significant ($p \leq 0.01$) in all categories. Another variable, $\Delta$CH, is strongly significant ($p \leq 0.01$) for FA write-offs.[18] These results contrast with the pooled logistic results, where both $\Delta$MD and $\Delta$CH are not observed to be significantly related to the occurrence or the magnitude of a write-off. One likely explanation is that once the new management has decided to undertake a write-off, it will be a 'large' one, presumably to create reserves for future restructuring costs and to obtain higher performance-linked compensation in the future. The new management may prefer write-offs in the fixed assets category, since they usually provide more room for discretion.

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[17] *The Business Times* (18 April 1997) reports, 'Market Value of Mandarin $403m Above Book Value', suggested that the owner of the hotel, Overseas Union Enterprise Limited, decided against raising its book value as the move would do no good to its share price and could instead lead to lower future profits due to higher depreciation charges.

[18] Francis *et al.* (1996) also find that the magnitude of a write-off is positively related to a change in management.

### TABLE 7

### OTHER OLS REGRESSION RESULTS RELATING MAGNITUDE OF WRITE-OFFS TO BOTH FIRM SPECIFIC AND MACROECONOMIC VARIABLES[a]

| Variable[b] | Expected sign | Fixed assets (FA) OLS II[c] | Investments (INV) Cochrane–Orcutt I[d] | All assets (ALL) OLS II |
|---|---|---|---|---|
| COM | | –0.007 | –0.060* | –0.003 |
| HTLREST | | –0.015* | –0.060* | –0.011** |
| MFG | | 0.003 | 0.049 | 0.008 |
| MU | | –0.003 | –0.041 | 0.001 |
| PROP | | –0.009 | –0.020 | –0.002 |
| ΔCH | + | 0.015*** | 0.018 | 0.004 |
| ΔMD | + | –0.010 | –0.027 | 0.000 |
| ROA | – | –0.101*** | –0.528*** | –0.063*** |
| D/A | – | –0.022** | 0.013 | –0.018** |
| ΔGDP | – | –0.122 | –0.330 | 0.058 |
| ΔINTEREST | + | –0.002 | 0.022 | 0.019 |
| ΔUNEMPLOY | + | NA | 0.051 | 0.021** |
| ΔSES ALL-PROP | – | 0.004 | NA | NA |
| OCCUP | – | –0.002*** | NA | –0.002*** |
| ΔSES ALL-SPORE | – | NA | –0.042 | –0.010 |
| Constant | | 0.223*** | 0.132*** | 0.230*** |
| Adjusted $R^2$ | | 0.218 | 0.110 | 0.129 |
| *F*-value | | 6.684*** | | 6.165*** |
| Durbin–Watson value | | 1.903 | | 2.086 |
| Number of observations | | 279 | 293 | 496 |

[a] The dependent variable is the magnitude of the asset write-off, given a firm has already made a write-off in a given year. (This magnitude is deflated by the value of that asset category [before any write-off].)

[b] COM equals to 1 if the firm belongs to the Commerce sector.
HTLREST equals to 1 if the firm belongs to Hotel/Restaurant sector.
MFG equals to 1 if the firm belongs to Manufacturing sector.
MU equals to 1 if the firm belongs to Multi-Industry sector.
PROP equals to 1 if the firm belongs to Property sector.
ΔCH refers to a change in chairman in a given year.
ΔMD refers to a change in managing director in a given year.
ROA refers to return on assets.
D/A refers to debt-to-asset ratio.
ΔGDP refers to the rate of change in GDP.
ΔINTEREST refers to the rate of change in interest rate.
ΔSES ALL-PROP refers to the rate of change in SES All-Property Index.
OCCUP refers to the average occupancy rate.
ΔUNEMPLOY refers to the rate of change in unemployment rate.
ΔSES ALL-SPORE refers to the rate of change in SES All-Singapore Index.

[c] OLS II covers the period 1985–97.

[d] Cochrane–Orcutt I estimator covers the period 1983–97. OLS I (not reported in detail here) is not noticeably different from Cochrane–Orcutt I.

*Note*: ***, ** and * indicate that the coefficient is at 0.01, 0.05 and 0.10 significance level, respectively.

The leverage variable, D/A, is significant ($p \leq 0.05$) for both FA and ALL write-offs. This seems to suggest that, following a firm's decision to undertake a write-off, the D/A ratio would become an important determinant of the magnitude of write-off, probably because of the concern of violating a debt covenant. The insignificant results for the D/A variable in the INV category can again be rationalized by the limited discretion management can exercise in deciding in principle whether to write down the values of investment assets, as well as the amount to be written off once a write-off decision has been made.

Previously, it was observed, from the pooled (logistic) regression results, that firms make more frequent property (FA) write-offs when property vacancy rates are higher, and that aggregated (ALL) write-offs are also related to the property vacancy rate. A similar pattern is observed in Table 7. Firms make larger property and aggregated write-offs when property vacancy rates are higher, as indicated by the significant results ($p \leq 0.05$) obtained for OCCUP for both FA and ALL write-offs. As with the earlier results (time-series and pooled tobit regressions), the $\Delta$UNEMPLOY variable is again observed to be significant ($p \leq 0.05$) for the ALL write-offs category.

## CONCLUSIONS

This study shows that the unemployment rate, GDP growth rate and occupancy rate of properties are important determinants of a firm's write-off decision. In addition, return on assets and a change in chairman are important firm-specific factors related to the write-off decision.

Some caveats must be mentioned. First, inadequate disclosures by some firms regarding write-offs might affect the results and conclusion. Second, as the macroeconomic and firm-specific data are not synchronized to the same time frame (the former is based on the calendar year, while the latter relates to a firm's financial year), our results could have been weakened. Third, the results for the time-series models may not be robust because of the shortness of the series. When a longer time series become available, it should be possible to undertake a longitudinal study of each firm's write-off history.[19] Another extension would be to examine whether write-off announcements have a signalling effect and, if there is one, to explain cross-sectional variation in the extent of the impact of each one. Past studies, which are mainly U.S.-based, generally have yielded mixed results.

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[19] Francis *et al.* (1996) find that the magnitude of the write-off is positively related to a change in management, as well as the write-off history of the firm.

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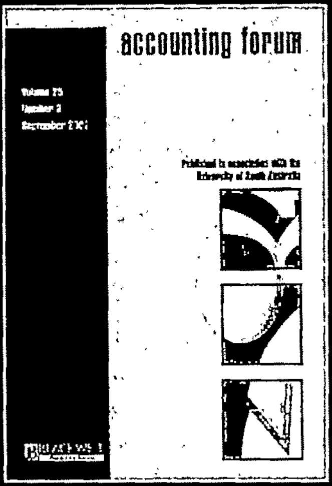

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*ABACUS, Vol. 38, No. 2, 2002*

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# AUDITOR INDEPENDENCE REFORMS—RECYCLED IDEAS

Recent financial imbroglios at Enron in the U.S. and HIH in Australia have involved the same major auditing firm and resulted in much talk of a need for immediate reforms. These *déjà vu* proposals include: a desire for better (higher *quality*, in the new-millennial jargon) information for investors, making executives more accountable, and developing stronger more accountable auditing systems (see Chambers, 1973; Clarke *et al.*, 1997). To this end, currently there are specific calls to prohibit joint provision of audit and non-audit services, and to mandate audit committees and auditor rotations.

The tone of the rhetoric mimics that surrounding like sagas in previous decades. These include in the U.S.: the Penn Central and Equity Funding affairs of the 1970s and the S&L fiascos in the 1980s and '90s; the unexpected collapses of Minsec and Cambridge Credit Corporation in Australia in the 1970s, of Bond Corporation and Adsteam in the 1990s, and of One.Tel and Ansett in the new millennium; and the U.K. collapses of Pergamon in the 1970s and the Maxwell Corporation and BCCI debacles of the 1990s. On each occasion accounting and auditing practices have been criticized. Reform has been demanded and promised, only to lapse once the outrage has been aired.

Invariably unease and calls for reform have followed large unexpected failures not long after the reporting of their financial results with clean audit reports. Recent revelations related to HIH and Enron have again led many to question the usefulness of audited accounting data as a sound basis for financial assessments and evaluations by investors, regulators and other interested parties. The particulars of the collapses and perceived accountability deficiencies have caused some to argue that there has been a loss of confidence in the securities market being a 'fair game'. Others have observed that accounting and auditing is in a 'state of crisis' (Volker, 2001, as cited in Dean, 2002). The reprises are certainly familiar. Consider the following unpublished words of the founding editor of this journal, Ray Chambers. In 1979, responding to proposals by a contemporary iconoclast, Professor Abe Briloff (private correspondence; Chambers Collection, 22 March 1979 and 5 March 1979)[1] Chambers disagrees with Briloff's suggestion that the problems besetting accounting and auditing would be largely ameliorated were accountants and auditors to practise what Briloff described as 'the three *I's—Integrity, Independence* and *Intrepidity*':

> The qualities of independence, integrity and intrepidity are admirable personal qualities—of auditors, and everyone else. What is specific to auditors, however, is not these things, but a particular skill with numerical and verbal symbols. That is fundamentally what is wrong with the profession. An auditor may have the three 'Is', in some sense, and still do a bad job because he doesn't understand the job. For that I believe several generations of teachers are to blame (though the fault lies not only there). If we teach people that they can aggregate dissimilar quantities; that they can mix past, present, future statements; that they can mix fact with opinion—they will go away and do all those fallacious things, with the best of intentions, and still do an unreliable job.
>
> One of our differences, I think, lies in your preoccupation with abstract ideals, something after the style of Platonic philosophy. Your letter refers several times to 'truth'. But it's very difficult to say what truth is, in the abstract. I think I have heard you say, or seen you write, something which frankly admits that: one cannot perhaps say what is 'good fish', but he certainly can say what is 'bad fish'. It is quite possible to say that a specific statement is a true statement without getting into any argument about 'what is truth'; for a true statement is a statement that is verified by following the steps accepted as the means of distinguishing true statements from false statements
>
> I agree that every man may clothe his utterances in words of his own choice. But communication rests on cognitions shared by the speaker and his audience; if he is to convey any message, his freedom of choice is thus restricted, disciplined, by what his audience can grasp. When a magician saws a young lady in half, we know he is doing something else altogether; we (the audience) know it is an illusion. But when an accountant adds up numbers which auditors make some assuring noises about, we do not expect the result to be, or to be intended to be, an illusion. And yet it is, if the aggregation is logically improper. The accountant and the auditor do not think it is an illusion, because they have been taught that it is a quite proper thing to do. They have been deluded—into asserting that something is the case at a specific date when it is certainly not the case. They have learned an 'unskilful skill' or an 'unserviceable skill'.

The co-authors of this editorial share similar views to Chambers. Regarding the myriad *déjà vu* responses to the current (almost identical) claims against the profession, and the concomitant similar regulatory and professional reform proposals being canvassed, we argue that they are essentially cosmetic. They are likely to have minimal effect in preventing the types of large unexpected collapses and associated wealth redistributions that were the catalysts for the demand for such reforms.

The size and continuity of the unease expressed in the financial press and from witnesses called before the numerous inquiries in the U.S. and Australia following the Enron and HIH collapses confirm that auditors are definitely under scrutiny. The U.S. Grand Jury indictment of Andersen, LLP, on obstruction of justice charges confirms that.

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[1] As noted in the Chambers Festschrift issue of *Abacus* (2000), the Chambers Collection includes Chambers' correspondence files from 1947 to 1999—over 30,000 items. The Chambers Collection is part of the Fisher Library Archives at The University of Sydney. The archiving of the collection is ongoing.

Where auditors are found to be dishonest, allow inducements to compromise their work, or are dilatory or incompetent, they deserve to be punished. That is a matter of not being professional. Yet, incongruously, auditors can be as honest as possible, have impeccable integrity and be competent and intrepid to the hilt, but if they follow the conventional accounting rules, almost certainly they will be signing off on what mostly is financial nonsense! The lynchpin of auditing has been left out of the discussion to date—for the necessity that accounting data are serviceable in the uses ordinarily made of them lies at the core of the audit function. As it is, auditors are on 'a mission impossible' (Clarke *et al.*, 1997).

Recent letters in the Australian press, numerous editorials about HIH and Enron, articles like Brown's 'The Rough Side of Smoothing' (*Australian Financial Review* [*AFR*], 7 February 2002), Kohler's 'Horrible Numbers' (*AFR*, 4 February 2002) and the numerous expressions of unease over U.S. companies' use of 'pro forma earnings statements' to allegedly mislead (see references in Dean, 2002) have highlighted concerns about auditing and accounting. 'Taking Stock of Auditors' (Editorial, *AFR*, 29 January 2002) is a reasonable call, as is Ferguson's search for 'The Culprits in Corporate Collapses' (*Business Review Week*, 12 December 2001). More apt is Jaworski's claim that 'Accounting Is the Critical Issue', (*AFR*, Letters, 8 February 2002).

'Audit failure' is currently depicted as primarily a matter of a lack of auditor independence. This is contestable. In Australia the Ramsay Report on 'auditor independence' (2001), like its predecessors that have looked at the quality of audits and the public's expectations of them, confines the independence debate to the ethical dimensions of the auditor–client relationship. The proposed reforms ignore the constraints imposed by accounting rules upon the auditor's ability to form an 'independent opinion' on financial statements. Thus, they have little likelihood of being successful.

While the auditing independence debate resurfaced in Australia soon after the HIH, One.Tel and Ansett collapses, unwarranted parallels have been drawn between them and the Enron saga in the US. Of course, insofar as HIH is concerned, the Andersen firm is a common element. So is the appointment of past Andersen auditors of Enron to its board and the apparent provision of non-audit services (NASs) by Andersen to their audit clients HIH and Enron. Nonetheless, it is sobering to note that there does not appear to be any statistical relationship between the provision of NASs and the form audit reports take, and we are unaware of any compelling anecdotal evidence of cases where those dual activities have been *shown* to have compromised the independence of the auditors. The Enron case is curious in this respect: US$27 million in NASs has been rated against US$25 million in audit fees. Perhaps it might be that the amount of the audit fees compromises the quality of non-audit advice provided. It is argued in the U.S. that the NAS income is 'more valuable' than the audit fee because it has a greater potential to increase. Be that as it may, a US$25 million audit fee is no small matter. With that at stake, the existence of NASs would seem insufficient reason to cry a lack of independence—the audit fee itself is enough to have pinched Andersen were it to have been lost.

More to the point is the matter of professionalism—whether the auditor has an independent frame of mind in forming an opinion regarding the 'truth and fairness' of the financial statements; whether those statements truly indicate the performance and financial position of the company. Here, auditors are faced with a no-win situation. They are required to form their opinion regarding whether the Statement of Performance and the Statement of Financial Position are 'true and fair' indicators of the company's financial performance over the stipulated period and its financial position at the stipulated date. Yet this is to be conditioned by (a default) recourse to (so the general belief seems to be) whether the company has complied with the Accounting Standards, Australia's GAAP. However, a company's compliance with the standards virtually ensures that the income statement will not show its actual financial performance or the balance sheets its actual financial position in any meaningful way.

While in Australia the HIH Royal Commission is yet to report on its enquiries into such matters, HIH's published financials at 30 June 2000 brought to account nearly $1 billion of Future Income Tax Benefits, Goodwill and various capitalized expenses, all in accord with the prevailing standards. Those balances are of highly contestable relevance to any assessment of the company's solvency at the time or of its overall financial position. That scenario is not unique to HIH. It has been the story in respect of so many of the other companies that have collapsed unexpectedly—their financial statements, though primarily in accord with the prescribed accounting rules, conventions and standards of their time, have failed to provide reliable indications of the drift in their wealth and financial progress. On numerous occasions we have drawn attention to how the artefacts of conventional accounting prevent financial statements from disclosing dated commercial realities while making auditors substantially dependent upon the preparers of accounts for the dubious financial information reported in them (Clarke *et al.*, 1997; Wolnizer, 1995). For example, it is worth asking what is the financial significance of accounting artefacts such as tax effect balances?, the tax effect calculation of income tax expense charged against revenues to quantify financial performance?, the capitalization of expenses?, booking a variety of intangibles and goodwill as assets?, not 'marking-to-market' physical assets?, amortizing historical costs?, applying the 'accrual principle' on a temporal basis?, recognizing only 'realized gains' but both realized and unrealized losses?, or preparing consolidated financial statements?

Since the U.K. Companies Act of 1844 directors of companies have been charged with the responsibility to *prepare* financial reports and auditors to *authenticate* the contents of them. The perception that company directors and officers, more familiar with company affairs than auditors could possibly be, might influence the opinions formed by auditors provoked the notion that auditors should be free of non-trivial commercial dealings with clients and their officers and free of family ties with those officers. The recommendations of the Australian Federal government-initiated Ramsay Report into auditor independence thus draw upon long-standing thought. Those freedoms were to be the guarantors of the reliability of the financial accounts—the substance of what is now implied by the notion of audit independence.

However, such impartiality has little, if anything, to do with the quality of information. At the end of the day the quality, the reliability, the comparability, the authenticity of the information set out in the financial statements depends primarily upon the accounting methods used in their preparation. Over time the idea of authenticating the contents of periodical accounts by recourse to independent evidence has, with the exception of cash, receivables and payables, been submerged. Recourse to external evidence has been replaced by professional prescription of the manner in which financial statements are to be prepared without considering whether the data are generally serviceable for the purposes made of them—determining the wealth and progress of the companies to which they relate and deriving indicators of their salient financial characteristics.

Of importance is the fact that the compulsory accounting infelicities noted above exist equally in the accounts in those companies that have not collapsed. The evidence is that compliance with the accounting standards is a pervading cause of misleading, *creative*, accounting data (see evidence in Clarke *et al.*, 1997). On that count, the financials of most of the companies that have failed are frequently as unreliable as those that have not. For the most part, auditors are caught in the accounting GAAP trap. Auditors are denied the opportunity to exercise a 'mental attitude' in order to form an opinion that is 'independent' of those who prepare financial statements. Apart from cash, cash-like items and those few assets that are required to be marked to market, auditors do not have recourse to commercial evidence outside of the reporting entity when forming an opinion on the accounts. In a most important respect, by no fault of their making, auditors are 'dependent'. This is not because of malpractice on their part, but by virtue of the demonstrably defective accounting and reporting system in which auditing functions.

Ramsay's Auditing Independence Supervisory Board and mandatory audit committee and auditor rotation recommendations (and similar reform proposals being mooted internationally by IFAC and in the U.S. in response to the Enron collapse), address the 'independent status' of auditors rather than their 'independence of mind'. Unlike the law where the independence of judicial opinion is buttressed by the laws of evidence, the independence of auditors' judgments has no corresponding safeguard. Unless and until auditors are required to obtain commercial evidence of financial facts outside the reporting entity the independence debate is likely to continue to rage without satisfactory resolution, as has been the case for several decades.

In the absence of full mark-to-market accounting that has external commercial referents, auditors shall continue to be at the behest of their clients' financial calculations—a situation in which 'independence of mind' can neither exist nor be shown to exist. There is little likelihood that the recycled ideas being proposed will mitigate unexpected corporate collapses and their associated fallout.

Accounting is, and always has been, the core focus of the audit of published financial statements. Reliable financial statements are the very objects of the independence rules! Compulsory compliance with the present crop of accounting standards poses the greatest threat to auditors' *independence*. That constraint

*ABACUS, Vol. 38, No. 2, 2002*

DAVID JOHNSTONE

# Public Sector Outsourcing as an Exchange Option

The outsourcing of government activities is justified primarily by expected cost savings. In the formal process of determining whether there are potential savings from contracting out, public sector agencies in Australia are required by published government guidelines to measure the relevant costs of in-house activities and to compare these with external bids. Similar and in technical respects essentially identical requirements exist in Great Britain. The cost comparison methodology advocated in these various publications is deficient in that it makes no allowance for the financial value of the option to contract out. Like other options, the option to contract out provides a hedge against uncertainty, and is all the more valuable the more uncertain (less predictable) the agency's future costs of in-house and external service arrangements. In the face of inherently uncertain cost streams, there is something to be said for conserving all available options. By interpreting the option to contract out as a financial asset with theoretically measurable value, arguments for government agencies maintaining at least some in-house capabilities are given a basis in 'rational economics'.

**Key words:** Exchange options; Outsourcing; Real options; Risk-neutral option pricing.

With the same commitment to public sector managerialism (e.g., minimum services at minimum cost) as recent governments in Britain and New Zealand, State and Federal governments in Australia have embraced the ideals of contracting out and 'compulsory competitive tendering'. A common concern among public sector agencies pressured by governments to outsource activities is the possibility of not being able to 'go back' if projected cost savings fail to materialize or prove unsustainable (Industry Commission, 1996, p. 270). The danger for agency managers is that having to some extent burned their bridges by dismantling and selling off in-house facilities, their perpetually uncertain cost projections, which previously favoured outsourcing, may swing back in favour of internal production:

> Once a service is contracted out, council will lose the technical expertise, infrastructure and plant needed to carry out the service itself. This carries potential risks if the contractor cannot or is unable to provide the service economically. (Department of Local Government [N.S.W], 1997, p. 7)
>
> [T]here are few local tenderers and the risk of one or two monopolising the field with inherent future price rises becomes a reality. Once Council [loses] its expertise in the field

---

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> and disposes of its plant, it is very difficult to start up again if the contractor becomes unsuitable . . . (Council Submission, Industry Commission, 1996, p. 270)

Where it is possible to re-establish internal operations without prohibitive 'transaction costs', outsourcing does not present the same risk. Yet circumstances in which such efficient switching from 'buy' back to 'make' cannot be taken for granted. There are numerous economic and political barriers to entry that make reversal of public sector outsourcing decisions difficult, if not out of the question, at least in the medium term. These include not only the investment and knowledge needs of replacing infrastructure and recruiting appropriately skilled staff, but also the institutional resistance to reversing a course of action proclaimed previously to be rational.

Once an activity is terminated, its capital assets sold off (often at prices much less than replacement cost), and stakeholders persuaded of the innate economic advantages of external market providers, the political cost of a return to in-house activity, both to the agency itself and the government responsible, may exceed the residual economic benefits of reversal.[1] There must also be some uncertainty about whether economic benefits remain, even if in hindsight they were there for the taking (e.g., with better management) before the decision to outsource. Decisions to dismantle internal activities damage the economics of in-house production in ways that if not permanent at least make them costly to rebuild. For example, to recreate a production facility the agency will generally incur the capital costs of (either owning or leasing) all new assets, where previously it used depreciated assets at relatively low cost in terms of further depreciation (decline in market value) and opportunity cost (foregone interest on market value tied up in assets).[2] Similarly, where previously well-qualified employees were attracted to the public sector for its 'inherent' predictability (e.g., certainty of long-term employment), the uncertainties and pervasive cultural change that come with outsourcing mean that no longer will they accept salaries without market risk premia. A culture of paying market based and thus generally much higher than historical salaries becomes the norm and thence unavoidable.

Such 'hidden' costs of a free market ethos in the public sector are not so subtle as to elude thoughtful economic analysis. However, rather than treading warily, governments have acted on an almost apolitical conviction that the implicit benefits of 'smaller government' and 'steering not rowing' will more than offset any downside. Critics of this untempered reform process, Carlin (2000), Walker and Con Walker (2000) and Funnell (2001), argue that downsizing (outsourcing and privatization) in the Australian public sector has been driven as much or more by faddish economic ideology and the sway of vested interests (e.g., corporate lobby groups, private sector consultants, careerist econocrats) as by legitimate economic assessment.[3] In this era of public sector acceptance and mimicry of private sector means and ends, with its formidable intellectual roots in the ideals of free-market economics and the committed support of much of the bureaucracy, examples of unsuccessful and wasteful outsourcing are unlikely to be interpreted as systemic. Instead, the impetus is towards more politically sophisticated, if not more economic, outsourcing, typically involving costly third party consultancies and a culture of bureaucratic obfuscation (Funnell, 2001).

---

[1] Research on 'the sunk cost effect' in psychology and behavioural economics suggests that decision makers are influenced by what they have committed already (money, time and their reputations) into persisting with decisions even when there are objective grounds for giving up. (Shefrin, 2000, pp. 24–5). This natural psychological inertia makes reversal of unsuccessful outsourcing decisions less likely than would be the case on rational economic grounds.

[2] See Johnstone (1999) for discussion on measuring capital costs in the context of outsourcing decisions.

## THE OPTION TO CONTRACT OUT

Before they contract out, government agencies have the option to do so—and thus not to do so—that is, to wait. Like other options, the option to contract out is a hedge or kind of insurance against events which may or may not occur but which are potentially damaging if they do occur. In the case of contracting out, the hedge is against the event of in-house costs increasing greatly relative to the price of a contractor. If this event occurs, the agency has the flexibility to avoid cost increases by outsourcing. If it doesn't then the agency benefits from the relatively low in-house service costs. Either way, it is shielded from cost increases.

The advantage of an option is that it can never make things worse but can possibly make them better. The worst possible outcome is that the option is of no use, as occurs when exercising it would hinder rather than help. For example, if the costs of insourcing are clearly less than the expected costs of outsourcing, then the option to outsource is for the moment at least of no consequence (in options terms it is 'out of the money'). It is not of negative value, however, because by definition there is no obligation to exercise. On the other hand, if outsourcing costs are less than those of insourcing, then the option to outsource is immediately valuable ('in the money'). Given even a slight chance that an option will in the future be valuable (worth exercising), its statistical expected value—and hence its current 'price'—is greater than zero.

In circumstances where it is not possible to re-establish an in-house activity, for whatever physical, political or financial reasons, an agency which exercises its option to contract out is no longer hedged.[4] By being exercised, the option to contract out is lost. Such loss is implicit whenever an action taken is in any way irreversible, since once action is taken the option not to take it, or merely to wait before making a decision (on what would by then be further evidence) is foregone. This means a loss of opportunity and hence potentially a loss of money—for example, after outsourcing, an unavoidable increase in operating costs.

[3] Consistent with suspicions of inherent bias, Johnstone (1999) and Walker and Con Walker (2000) found that the costing procedures promoted by Australian state treasuries for use by government agencies in their comparisons of in-house and external production costs contain a pattern of technical flaws and distortions which systematically (whether or not intentionally) favours outsourcing.

[4] In principle, there is perhaps always the option to switch back or 'contract-in', even immediately upon contracting out, but if the cost of exercising this option is prohibitive then the option is practically valueless and effectively non-existent.

For this reason, it has become a logical principle in financial economics that no investment (or equivalently divestment; e.g., liquidation of productive assets) should take place unless its net benefits at least compensate for the loss of the 'option to wait'. Conventionally, investment or divestment is seen as acceptable when NPV exceeds zero. The variation on this rule dictated by options theory is that any action (e.g., outsourcing) that reduces managerial flexibility in ways which may prove very costly, is acceptable only if its NPV exceeds the financial value of those options given up:

> When investment is irreversible and future demand or cost conditions are uncertain, an investment expenditure involves the exercising, or 'killing', of an option—the option to productively invest at any time in the future. One gives up the possibility of waiting for new information that might affect the desirability or timing of the expenditure; one cannot disinvest should market conditions change adversely. This lost option value must be included as part of the cost of the investment. (Pindyck, 1988, p. 969)

> Management's flexibility to adapt its future actions in response to altered future market conditions expands an investment opportunity's value by improving its upside potential while limiting downside losses relative to management's initial expectations under passive management. The resulting asymmetry caused by managerial adaptability calls for an *expanded* NPV rule reflecting both value components: the traditional static or passive NPV of direct cash flows and the option value of operating and strategic adaptability. (Trigeorgis, 1995, p. 2)

## OPTION VALUATION USING EPV

Traditionally, option values have been accounted for, usually implicitly, within the framework of expected present value (EPV). More recently, finance theorists have developed methods of 'risk-neutral' option valuation, which, although reconcilable with EPV, have such conceptual and technical advantages that EPV option valuation is now all but obsolete. The analysis in this article involves both ways of option valuation, and also their reconciliation. Explanation begins with how the option to contract out can be understood and valued within conventional EPV analysis.

Consider the following highly simplified two period model. An agency has an in-house activity with uncertain future costs, and is considering contracting this activity to an external supplier with similarly uncertain but different future costs (i.e., periodically renegotiated contract fees). Either way, the costs in period 1 can take one of two possible values. The in-house (*IH*) costs in period 1 can be either \$100 or \$200, with suppose equal probabilities, and the contractor (*OH*) fees can be either \$60 or \$220, also with equal probabilities. And in period 2, with either *IH* or *OH*, costs will be the same as for period 1, with certainty. Given this information, which of the two service providers, *IH* or *OH*, should be chosen?

The conventional answer to this question, as exhibited in the various costing guidelines, is found as follows. The expected costs per period of *IH* are 0.5(100) + 0.5(200) = \$150 and hence the present value of expected costs is

$$EPV_{ih} = \frac{150}{(1+r)} + \frac{150}{(1+r)^2} = \$260.33,$$

TABLE 1

| *IH* | *OH* | Switch to *OH* at time 1? | Period 2 costs |
|---|---|---|---|
| 100 | 60 | Yes | 60 |
| 100 | 220 | No | 100 |
| 200 | 60 | Yes | 60 |
| 200 | 220 | No | 200 |

taking $r = 0.10$, for example, as the chosen discount rate (opportunity cost of capital).

By comparison, the expected costs of *OH* are 0.5(60) + 0.5(220) = \$140 per period, and hence the present value of expected costs is

$$EPV_{oh} = \frac{140}{(1+r)} + \frac{140}{(1+r)^2} = \$242.98,$$

again with $r = 0.10$. This is less than $EPV_{ih}$, and hence the apparent conclusion on cost grounds is that the activity should be outsourced.

The reverse is true, however, when the option to contract out is valued and accounted for in the calculations. To find this value, consider a third alternative, that of persisting during period 1 with *IH* (i.e., waiting) and then deciding at the end of that period whether to stay in-house during period 2 or to contract out. Denote this alternative by *IH** so as to distinguish it from *IH*. Specifically, *IH** is *IH* with the option of switching to *OH* at the end of period 1. Under *IH** the agency stays with the in-house provider for period 1 but is ready to switch to *OH* for period 2, thus retaining for one more period its option to continue with *IH* or switch to *OH*. At the end of this period, it opts for whichever provider had lower costs during period 1 (assuming zero transition costs), since both providers' costs will remain the same in period 2. There are four possible outcomes, each with equal probability (assuming statistical independence), as shown in Table 1.

Given these four possibilities, and assuming rational choice at period end, the present value of expected costs of *IH** is

$$EPV_{ih^*} = \frac{150}{(1+r)} + \frac{1}{(1+r)^2}\left[\frac{1}{2}(60) + \frac{1}{4}(100) + \frac{1}{4}(200)\right] = \$223.14,$$

with $r = 0.10$. This is the lowest present value of the three alternatives, *OH*, *IH* and *IH**, meaning that on the criterion of least expected cost *IH** is the best action.

Further, the value of the option to contract out is implied. This value is

$$\Omega = EPV_{ih} - EPV_{ih^*}$$

which for $r = 0.10$ equals \$260.33 − \$223.14 = \$37.19.

Note that the option value $\Omega$ can be zero but never negative, since $EPV_{ih^*}$ can only be less than or equal to $EPV_{ih}$. That is, rational use of the option to contract out can lead to a cost reduction but not to an increase.

The formal decision rule which accounts correctly for the value of the option to contract out is to outsource if

$$EPV_{ih*} > EPV_{oh},$$

or in terms of $\Omega$, if

$$EPV_{ih} - EPV_{oh} > \Omega,$$

these being different mathematical expressions of the same rule. This rule departs from the usual present value decision criterion advocated within the various official costing guidelines—that is, to contract out whenever $EPV_{ih} - EPV_{oh} > 0$—by its implication that expected costs savings might have present value greater than zero and yet not be sufficient to warrant the risk of outsourcing. To proceed otherwise is to ignore the financial value of the option to contract out, an option which is being exercised and hence lost.

## RISK-NEUTRAL OPTION VALUATION

Using the language and concepts of options theory, the option to contract out can be interpreted as a call option on a dividend paying stock. The 'stock' or 'underlying asset' is the stream of cost savings expected from outsourcing, which, like any dividend stream, has measurable present value. The exercise price is the cost of shutting down the in-house operation (redundancy payments, etc.) and of establishing a purchaser–provider relationship with a contractor (contract preparation, etc.). Because the option to contract out can be exercised at any time, it is an American rather than European call.

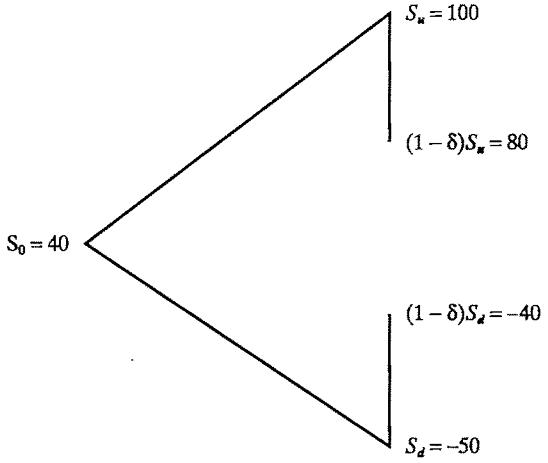
The standard technical device for calculating the 'risk-neutral' value of an American call on a dividend-paying asset is the binomial method. The inherent technical advantage of binomial option valuation is that, unlike analytical techniques such as Black–Scholes, it allows for the possibility that an option might best be exercised early (before expiry). This is particularly important in regard to the option to contract out, which, like other call options on dividend paying assets, should in some circumstances be exercised early (Cox and Rubinstein, 1985, p. 238). Indeed, because the option to contract out has no necessary expiry date, 'early' exercise is virtually certain.

Valuation of the option to contract out is not entirely conventional since the underlying asset can take either positive or negative values. Negative asset values occur when outsourcing is unsuccessful, bringing about a stream of additional costs rather than savings. Fortunately, negative asset prices cause no technical problems, and the usual textbook mathematics (Cox and Rubinstein, 1985) of risk-neutral option valuation using binomial models apply without change. This is despite the assumption of dividends as a constant percentage of the asset price, whether positive or negative. The workings of the standard model when the asset price and dividend are sometimes negative are illustrated as follows.

Consider a one period European call option on the asset depicted in Figure 1. The current (ex-dividend) value of this asset is $S = 40$. Its value cum-dividend at

FIGURE 1

OPTION VALUATION WITH NEGATIVE DIVIDENDS



expiry will be either $S_u = 100$ or $S_d = -50$. The dividend, accruing to those who owned it during the period, is $\delta = 20\%$. When its period end value is $S_d = -50$, the dividend is $\delta S_d = .2(-50) = -10$, meaning that the asset owner pays \$10 into the stock, leaving it an ex-dividend value of –\$40. This payment matches what happens when an agency's choice of outsourcing fails, causing periodic costs above those of insourcing. The additional periodic outlay is the agency's 'dividend' from outsourcing.

Assuming a strike price of $K = \$30$, the values of a call option corresponding to the period end ex-dividend asset values $(1-\delta)S_u = 80$ and $(1-\delta)S_d = -40$ are $C_u = \max[0, (1-\delta)S_u - K] = 50$ and $C_d = \max[0, (1-\delta)S_d - K] = 0$. The value of the call is then

$$C = \frac{pC_u + (1-p)C_d}{1+r} = \$28.4848, \tag{1}$$

where $r = 0.10$ is the risk-free interest rate, and $p$ is the 'risk-neutral' probability of a price increase

$$p = \frac{(1+r)S - S_d}{S_u - S_d} = 0.6267. \tag{2}$$

Dividing the above equation throughout by $(1-\delta)$, gives $p$ in terms of ex-dividend (rather than cum-dividend) stock prices

$$p = \frac{(1+r)(1-\delta)S - (1-\delta)S_d}{(1-\delta)S_u - (1-\delta)S_d}. \tag{3}$$

Because option values usually rest on ex-dividend prices (call options owners do not earn dividends until they exercise), it is computationally convenient to work with ex-dividend prices directly, thus calculating $p$ from (3) rather than (2). See the calculations in Figure 2 below, for example. Note that the mathematical relationship between cum-dividend and ex-dividend prices is not disturbed when the asset price slips to negative. The effect is simply that dividends also become negative, and dividend payments cause increases rather than decreases in the asset price.

Multi-period trees divide the life of an option into arbitrarily short intervals, and in the limit produce identical results to continuous time models such as Black–Scholes. For American options, which can be exercised early, multi-period trees must be solved using 'backward induction'; that is, by commencing calculations

FIGURE 2

VALUE OF OPTION TO OUTSOURCE

| | |
|---|---|
| Risk-free rate $r$ | 0.1 |
| Dividend rate $\delta$ | 0.06 |
| Strike price $K$ | 3 |

| | | | | |
|---|---|---|---|---|
| Ex-dividend asset price | | | | 11 |
| | | | 9 | |
| | | 7 | | 8 |
| | 5 | | 6 | |
| | | 1 | | 4 |
| | | | –10 | |
| | | | | –30 |

| | | | |
|---|---|---|---|
| Risk-neutral probability of step up | | | 0.4353 |
| | | 0.4127 | |
| | 0.6950 | | 0.5510 |
| | | 0.6896 | |
| | | | 0.5782 |

| | | | | |
|---|---|---|---|---|
| European option price | | | | 8 |
| | | | 5.73 | |
| | | 3.71 | | 5 |
| | 2.89 | | 2.91 | |
| | | 1.97 | | 1 |
| | | | 0.53 | |
| | | | | 0 |

| | | | | |
|---|---|---|---|---|
| American option price | | | | 8 |
| | | | 6.00 | |
| | | *4.00 | | 5 |
| | 3.09 | | *3.00 | |
| | | 2.03 | | *1 |
| | | | 0.53 | |
| | | | | 0 |

at the time of option expiry and working backwards (from right to left). To allow for early exercise, the value of the option at any node is calculated as the maximum of its 'intrinsic' (exercise) value at that node and its 'holding value' (see example calculations below). Otherwise the binomial valuation equations are the same throughout the tree as those used above in the one period case.

A multi-period valuation model for the option to contract out is illustrated in Figure 2. The hypothetical ex-dividend price paths of the underlying asset (the value of cost savings) are shown beginning at \$5 and becoming either higher or lower depending on the step taken at each node (end of period). For example, if this value steps down over three periods in succession, the resulting asset value (present value of future costs) is –\$30, meaning that outsourcing has led to a stream of future costs much greater than those of insourcing. Other possible price paths are more favourable, all resulting in positive asset values after three periods.

Although in principle the option to contract out never expires, its life is effectively limited by the 'time value of money'. For practical purposes, it can be valued as if it expires in say thirty years, or at whatever future date cash flows (cost savings) are of negligible value from today's perspective. Taking its time to expiry as thirty years, each period in the three-period model illustrated is of ten years. A 30 (360) period binomial model would have periods of one year (one month) and produce an option value close (virtually identical) to that of an equivalent continuous-time model.

The risk-neutral probabilities shown in Figure 2 are calculated using equation (3) and assuming for the purpose of illustration a risk-free rate of $r = 0.10$ and a dividend rate of $\delta = 0.06$ per period. For example, at the node where the underlying asset price is \$6, the risk-neutral probability of an upward price movement is

$$p = \frac{(1+.1)(1-.06)6-4}{8-4} = 0.551,$$

and the risk-neutral expected value of the option is from equation (1)

$$\frac{.551(5)+(1-.551)(1)}{1+.1} = \$2.91.$$

This is the European or 'holding' option value at this node. The corresponding American option value is the higher of the option's 'holding' value and its 'intrinsic' (exercise) value, $\max\{0, S-K\}$, at the same node. That is

$$\max\left\{\frac{pC_u+(1-p)C_d}{1+r}, S-K\right\} = \max\{2.91, 6-3\} = \$3.00.$$

Applying the same equations recursively back through the binomial tree, the final (current) option values are \$2.89 (European) and \$3.09 (American). The more relevant of these is of course the American, since the option to outsource can be exercised at any time.

The intuition explaining this option value is apparent in the underlying asset tree. In essence, the option to contract out is the option to 'wait and continually re-evaluate' before deciding. Rather than being cautious, the agency could contract out immediately—by doing so it would earn expected cost savings of present value \$2 ($S - K = 5 - 3$). However, by waiting before making a decision, it can make expected cost savings of \$3.09 (the American option value). The difference is that by not outsourcing immediately, the agency will discover—before it commits itself—whether the value of cost savings from outsourcing has increased (to \$7) or fallen (to just \$1). If it goes up, the exercise value of the option (\$7 – \$3 = \$4) exceeds its holding value (expected value of retention) and the time has come to exercise. But if it goes down, there is only greater reason for caution, and the best action is to 'do nothing' (wait). Early exercise is optimal only when the cost savings (dividends) available from outsourcing exceed, in expected present value (EPV) terms, the benefits of waiting (watching for possible cost reversals). The starred *nodes in Figure 2 show where this occurs.

That risk-neutral option valuation takes implicit account of EPV, and is in fact the theoretically ideal way to calculate the EPV of an option, is not widely understood. The mathematical overlap between these two frameworks is explained in Cox and Rubinstein (1985, pp. 188–90) and Stoll and Whaley (1993, pp. 202–6). Both expositions rely on the CAPM to provide a mathematical relationship linking the (known) expected return on the underlying asset and the (unknown) required rate of return on the option. A more direct and intuitive reconciliation, not requiring CAPM, is provided belew. See also Johnstone (in press).

## OUTSOURCING AS AN EXCHANGE OPTION

Magrabe (1978) developed a Black–Scholes type analytical solution for the value of an option to exchange one risky asset (cash flow stream) for another. This is called an 'exchange option'. In principle, Magrabe's model aptly describes the option to outsource—that is, the option to exchange one cost stream (in-house) for another (out-house). The only deficiency of Magrabe's model with regard to the outsourcing option is that it is designed for European rather than American options, and does not allow for assets paying dividends and the possibility of early exercise: 'a primary problem preventing the direct application of Magrabe's formula to real-option situations is the assumption that the underlying assets pay no cash flows or other dividend-like payouts. With "dividends", no such analytic formulas exist' (Trigeorgis, 1999, p. 211).

To overcome this problem, it is necessary to develop a binomial (rather than analytical) form of the Magrabe solution, in the same way as was done initially by Cox *et al.* (1979) in the case of the Black–Scholes formula.

### *Binomial Valuation of Exchange Options*

Consider an option to exchange Asset 1 for Asset 2. Following Magrabe (1978), this is treated as a call option on Asset 2 with an exercise price of Asset 1 (or, equivalently, as a put on Asset 1 with an exercise price of Asset 2). Extending the usual assumption of geometric Brownian motion, the log returns on Assets 1 and 2 are taken as bivariate normal with volatilities $v_1$ and $v_2$ respectively, and correlation coefficient $\rho$. It is assumed that Assets 1 and 2 yield continuous dividends at rates $\delta_1$ and $\delta_2$ respectively.

By definition, the value at expiry time $T$ of an option-to-exchange Asset 1 (ex-dividend) for Asset 2 (ex-dividend) is given by

$$C^T = \max\{0, S_2^T(1-\delta_2) - S_1^T(1-\delta_1)\}.$$

Dividing both sides of this equation by the contemporaneous ex-dividend value of Asset 1, the option value at $T$ is re-expressed in units of Asset 1 rather than dollars

$$E^T = \frac{C^T}{S_1^T(1-\delta_1)} = \max\left\{0, \left(\frac{S_2^T}{S_1^T}\right)\left(\frac{1-\delta_2}{1-\delta_1}\right) - 1\right\}.$$

Note that with Asset 1 treated as the 'numeraire', the strike price of the option becomes a constant 1.

Given that the individual log returns on Assets 1 and 2 are bivariate normal with parameters $\nu_1$, $\nu_2$ and $\rho$, the log returns on the price ratio (Asset 1/Asset 2) are univariate normal, with volatility

$$\nu = \sqrt{\nu_1^2 + \nu_2^2 - 2\rho\nu_1\nu_2}. \tag{4}$$

By treating this ratio as the underlying asset, thereby reducing the number of state variables from two to one, it is possible to value exchange options using a binomial approach analogous to the original Cox *et al.* (1979) model.

Consider a one period model where the price of the underlying asset ratio is initially ex-dividend

$$\left(\frac{S_2}{S_1}\right)\left(\frac{1-\delta_2}{1-\delta_1}\right)$$

and in the period either goes up to cum-dividend

$$\left(\frac{S_2}{S_1}\right)^u = \left(\frac{S_2^u}{S_1^u}\right)$$

or down to cum-dividend

$$\left(\frac{S_2}{S_1}\right)^d = \left(\frac{S_2^d}{S_1^d}\right).$$

If the underlying asset ratio goes up, the option value, based on ex-dividend period end prices, and measured in units of ex-dividend Asset 1 is

$$E^u = \frac{C^u}{S_1^u(1-\delta_1)} = \max\left\{0, \left(\frac{S_2}{S_1}\right)^u\left(\frac{1-\delta_2}{1-\delta_1}\right) - 1\right\} \tag{5}$$

and if down

$$E^d = \frac{C^d}{S_1^d(1-\delta_1)} = \max\left\{0, \left(\frac{S_2}{S_1}\right)^d\left(\frac{1-\delta_2}{1-\delta_1}\right) - 1\right\}. \tag{6}$$

The period start option value $C$ is found as a function of $E^u$ and $E^d$ by an arbitrage argument based on Magrabe's insight that the option to exchange Asset 1 for Asset 2 is replicated by a portfolio of $\Delta_1$ units of Asset 1 and $\Delta_2$ units of Asset 2. The replica conditions are

$$C^u = \Delta_1 S_1^u + \Delta_2 S_2^u \tag{7}$$

and

$$C^d = \Delta_1 S_1^d + \Delta_2 S_2^d. \tag{8}$$

Dividing (7) by $S_1^u$ and (8) by $S_1^d$ gives

$$\frac{C^u}{S_1^u} = \Delta_1 + \Delta_2 \left(\frac{S_2}{S_1}\right)^u$$

and

$$\frac{C^d}{S_1^d} = \Delta_1 + \Delta_2 \left(\frac{S_2}{S_1}\right)^d.$$

Substituting for $C_u$ and $C_d$ using the relationships (5) and (6) leaves

$$E^u(1-\delta_1) = \Delta_1 + \Delta_2 \left(\frac{S_2}{S_1}\right)^u$$

and

$$E^d(1-\delta_1) = \Delta_1 + \Delta_2 \left(\frac{S_2}{S_1}\right)^d.$$

Dividing these equations by the initial ex-dividend asset value $\left(\frac{S_2}{S_1}\right)\left(\frac{1-\delta_2}{1-\delta_1}\right)$ gives

$$\frac{E^u(1-\delta_1)}{\left({S_2}/{S_1}\right)\left({1-\delta_2}/{1-\delta_1}\right)} = \frac{\Delta_1}{\left({S_2}/{S_1}\right)\left({1-\delta_2}/{1-\delta_1}\right)} + \Delta_2 u \tag{9}$$

and

$$\frac{E^d(1-\delta_1)}{\left({S_2}/{S_1}\right)\left({1-\delta_2}/{1-\delta_1}\right)} = \frac{\Delta_1}{\left({S_2}/{S_1}\right)\left({1-\delta_2}/{1-\delta_1}\right)} + \Delta_2 d \tag{10}$$

with 'up' and 'down' ratios defined as

$$u = \left(\frac{S_2}{S_1}\right)^u \Big/ \left(\frac{S_2}{S_1}\right)\left(\frac{1-\delta_2}{1-\delta_1}\right)$$

and

$$d = \left(\frac{S_2}{S_1}\right)^d \bigg/ \left(\frac{S_2}{S_1}\right)\left(\frac{1-\delta_2}{1-\delta_1}\right).$$

Solving (9) and (10) simultaneously reveals the values of the hedge parameters

$$\Delta_1 = \frac{(E^d u - E^u d)(1-\delta_1)}{u-d}$$

and

$$\Delta_2 = \frac{(E^u - E^d)(1-\delta_1)}{(u-d)\left(S_2 \big/ S_1\right)\left(1-\delta_2 \big/ 1-\delta_1\right)}.$$

To satisfy the 'law of one price' (preclude arbitrage opportunities) the unknown option value must equal the aggregate price of the hedge portfolio. That is,

$$C = \Delta_1[S_1(1-\delta_1)] + \Delta_2[S_2(1-\delta_2)].$$

Substituting in this equation for $\Delta_1$ and $\Delta_2$ gives the European option value

$$C = [pE_u + (1-p)E_d][S_1(1-\delta_1)](1-\delta_1) \tag{11}$$

where the 'risk-neutral' probability of an 'up' move in the underlying asset is

$$p \equiv \frac{1-d}{u-d} = \frac{1-\left(\frac{S_2}{S_1}\right)^d \bigg/ \left(\frac{S_2}{S_1}\right)\left(\frac{1-\delta_2}{1-\delta_1}\right)}{\left(\frac{S_2}{S_1}\right)^u \bigg/ \left(\frac{S_2}{S_1}\right)\left(\frac{1-\delta_2}{1-\delta_1}\right) - \left(\frac{S_2}{S_1}\right)^d \bigg/ \left(\frac{S_2}{S_1}\right)\left(\frac{1-\delta_2}{1-\delta_1}\right)}. \tag{12}$$

Since $(1-\delta_1) \to 1/(1+\delta_1)$ with decreasing $\delta_1$ (shorter periods in a multi-period model), the solution represented by (11) can be written in more familiar form as

$$C = \left(\frac{pE_u + (1-p)E_d}{(1+\delta_1)}\right)S_1(1-\delta_1), \tag{13}$$

where the conversion factor $S_1(1-\delta_1)$ merely translates $E = \dfrac{pE_u + (1-p)E_d}{(1+\delta_1)}$ to $C$, thus re-expressing the option value in dollars rather than units of $S_1$.

The American option value is the higher of the option's holding value (11) and its intrinsic value, $\max\{0, S_2(1-\delta_2) - S_1(1-\delta_1)\}$, which can be written as

$$C = \max\left\{\left(\frac{S_2}{S_1}\right)\left(\frac{1-\delta_2}{1-\delta_1}\right) - 1, \frac{pE^u + (1-p)E^d}{(1+\delta_1)}\right\}S_1(1-\delta_1). \tag{14}$$

Calculation of the value of $C$ is again most straightforward when $p$ is found directly from ex-dividend asset prices. This is achieved by re-writing (12) as

$$p \equiv \frac{1-d}{u-d} = \frac{\left(\dfrac{1-\delta_2}{1-\delta_1}\right)(1-d)}{\left(\dfrac{1-\delta_2}{1-\delta_1}\right)(u-d)} = \frac{\left(\dfrac{1-\delta_2}{1-\delta_1}\right) - D}{U-D} \tag{15}$$

with 'up' and 'down' ratios based on ex-dividend asset prices in both the numerator and denominator

$$U = \left(\frac{S_2}{S_1}\right)^{u}\left(\frac{1-\delta_2}{1-\delta_1}\right) \Big/ \left(\frac{S_2}{S_1}\right)\left(\frac{1-\delta_2}{1-\delta_1}\right) \tag{16}$$

$$D = \left(\frac{S_2}{S_1}\right)^{d}\left(\frac{1-\delta_2}{1-\delta_1}\right) \Big/ \left(\frac{S_2}{S_1}\right)\left(\frac{1-\delta_2}{1-\delta_1}\right).$$

Note that given small $\delta_1$, (15) can be written as

$$p = \frac{(1+\delta_1)(1-\delta_2) - D}{U-D}.$$

This matches the equation for $p$ in the usual, Black–Scholes-equivalent binomial model for an option on a stock paying a dividend yield of $\delta_2$ per period when the risk-free interest rate is $\delta_1$. Observing this analogy, Magrabe (1978, pp. 179–80) demonstrated that the value of a European exchange option can be found using the familiar Black–Scholes equation along with appropriate substitutions (treating $\delta_1$ as the risk-free rate and $\delta_2$ as the dividend rate). This possibility of redefining an exchange option into the form of a conventional option on a single underlying asset, and thus 'tricking' the Black–Scholes model into valuing it, offers an 'approximate' way of valuing outsourcing options in the absence of the binomial model above. The 'Black–Scholes' result (Magrabe's equation) gives the European exchange option value, and therefore a lower bound on the value of the (American) option to outsource.

### *The Model Applied to Outsourcing*

The outsourcing option is an option to exchange one cost stream of present value *IH* for another of present value *OH*. In terms of Magrabe's model, it is a call option on *IH* with an exercise price *OH*, where both *IH* and *OH* are positive amounts. By exercising its option to outsource, the agency effectively exchanges –*IH* for –*OH*, thereby making a saving of amount *IH* but incurring new costs of value *OH*. This is equivalent to exercising a call on a stock worth *IH* at an exercise price *OH*.

Applying the binomial model developed above, the option value at expiry time $T$ is

$$C^T = \max\{0, IH^T(1-\delta_{IH}) - OH^T(1-\delta_{OH})\}.$$

which for the purposes of the model is re-written as

$$\frac{C^T}{OH^T(1-\delta_{OH})} = \max\left\{0, \left(\frac{IH^T}{OH^T}\right)\left(\frac{1-\delta_{IH}}{1-\delta_{OH}}\right) - 1\right\}.$$

The underlying asset is the ratio of in-house costs to out-house costs. When this ratio is greater than one, the option is 'in the money'.

The only remaining definitional issue in applying Magrabe's model to the option to contract out is to do with the 'dividend' rates $\delta_{IH}$ and $\delta_{OH}$. In principle, these are the rates at which the values of the respective cost streams, *IH* and *OH*, are reduced by cash payments. For example, the amount *IH*, representing the present value of future in-house costs, is reduced by \$1 each time \$1 is paid in wages or other in-house expenditure. High $\delta_{IH}$ means that in-house operations involve a high payout rate, and when considered of itself adds to the argument for outsourcing (exercising a call on *IH*). This is in the same way as an investor might be motivated by a high dividend yield to exercise a call on a stock. Similarly, high $\delta_{OH}$ is of itself reason for not outsourcing. Note that for a cost stream in the form of a perpetuity, the payout rate equals the capitalization rate (discount rate) at which the perpetuity is valued.

### *Example Calculations*

To illustrate use of the binomial exchange options model in valuing the option to outsource, consider the example calculations shown in Figure 3.

The assumed input values are as follows:

Asset 1 price $OH = \$80$
Asset 2 price $IH = \$100$
$\nu_1 = \nu_{OH} = 0.4$ (per annum)
$\nu_2 = \nu_{IH} = 0.2$ (per annum)
$\rho = 0.5$

$\delta_1 = \delta_{OH} = 0.10$ (per annum)
$\delta_2 = \delta_{IH} = 0.10$ (per annum)
$T$ (time to expiry) = 10 years
$n$ = number of periods in model = 10

Based on these values, the American option value is \$31.452 or 0.393 units of Asset 1 (each worth \$80). A brief explanation of the spreadsheet calculations is as follows. Using the above values of $\nu_1$ and $\nu_2$, the volatility of the underlying asset ratio $\nu = 0.3464$ is found using (4). The values of the 'up' and 'down' ratios, *U* and *D*, defined by (16) and (17), are fixed as functions of the asset volatility and the binomial period length according to the standard Cox *et al.* (1979) formulae,

$$U = e^{\nu\sqrt{T/n}} = 1.4139 \quad \text{and} \quad D = \frac{1}{U}.$$

These formulae give values for *U* and *D* which in conjunction with (15) cause the binomial process to emulate the assumed lognormal stochastic returns behaviour of the underlying asset. From (15), the risk-neutral probability of an 'up' movement is $p = 0.4142$. With this value for $p$, and applying the same pattern of 'backward induction' as in the earlier example, the European option values at each node are found from (13) and the American option values from (14).

FIGURE 3

BINOMIAL EXCHANGE OPTION VALUATION

| | | | |
|---|---|---|---|
| Asset 1 (*OH*) | 80 | v | 0.34641 |
| Asset 2 (*IH*) | 100 | U | 1.41398 |
| $v_1$ | 0.4 | D | 0.70722 |
| $v_2$ | 0.2 | *p* | 0.41425 |
| $\rho$ | 0.5 | $(1-p)$ | 0.58575 |
| $\delta_1$ | 0.1 | | |
| $\delta_2$ | 0.1 | | |
| T (years) | 10 | | |

Underlying asset ratio

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 39.935 |
| | | | | | | | | | 28.243 | |
| | | | | | | | | 19.974 | | 19.974 |
| | | | | | | | 14.126 | | 14.126 | |
| | | | | | | 9.990 | | 9.990 | | 9.990 |
| | | | | | 7.065 | | 7.065 | | 7.065 | |
| | | | | 4.997 | | 4.997 | | 4.997 | | 4.997 |
| | | | 3.534 | | 3.534 | | 3.534 | | 3.534 | |
| | | 2.499 | | 2.499 | | 2.499 | | 2.499 | | 2.499 |
| | 1.767 | | 1.767 | | 1.767 | | 1.767 | | 1.767 | |
| 1.250 | | 1.250 | | 1.250 | | 1.250 | | 1.250 | | 1.250 |
| | 0.884 | | 0.884 | | 0.884 | | 0.884 | | 0.884 | |
| | | 0.625 | | 0.625 | | 0.625 | | 0.625 | | 0.625 |
| | | | 0.442 | | 0.442 | | 0.442 | | 0.442 | |
| | | | | 0.313 | | 0.313 | | 0.313 | | 0.313 |
| | | | | | 0.221 | | 0.221 | | 0.221 | |
| | | | | | | 0.156 | | 0.156 | | 0.156 |
| | | | | | | | 0.111 | | 0.111 | |
| | | | | | | | | 0.078 | | 0.078 |
| | | | | | | | | | 0.055 | |
| | | | | | | | | | | 0.039 |

European option value (in units of Asset 1)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 38.935 |
| | | | | | | | | | 24.766 | |
| | | | | | | | | 15.681 | | 18.974 |
| | | | | | | | 9.862 | | 11.933 | |
| | | | | | | 6.140 | | 7.430 | | 8.990 |
| | | | | | 3.766 | | 4.557 | | 5.514 | |
| | | | | 2.265 | | 2.730 | | 3.303 | | 3.997 |
| | | | 1.331 | | 1.589 | | 1.904 | | 2.303 | |
| | | 0.764 | | 0.898 | | 1.054 | | 1.239 | | 1.499 |
| | 0.428 | | 0.493 | | 0.563 | | 0.633 | | 0.698 | |
| 0.234 | | 0.264 | | 0.291 | | 0.311 | | 0.313 | | 0.250 |
| | 0.138 | | 0.146 | | 0.148 | | 0.137 | | 0.094 | |
| | | 0.072 | | 0.069 | | 0.059 | | 0.035 | | 0.000 |
| | | | 0.032 | | 0.025 | | 0.013 | | 0.000 | |
| | | | | 0.010 | | 0.005 | | 0.000 | | 0.000 |
| | | | | | 0.002 | | 0.000 | | 0.000 | |
| | | | | | | 0.000 | | 0.000 | | 0.000 |
| | | | | | | | 0.000 | | 0.000 | |
| | | | | | | | | 0.000 | | 0.000 |
| | | | | | | | | | 0.000 | |
| | | | | | | | | | | 0.000 |

⇒ $18.758

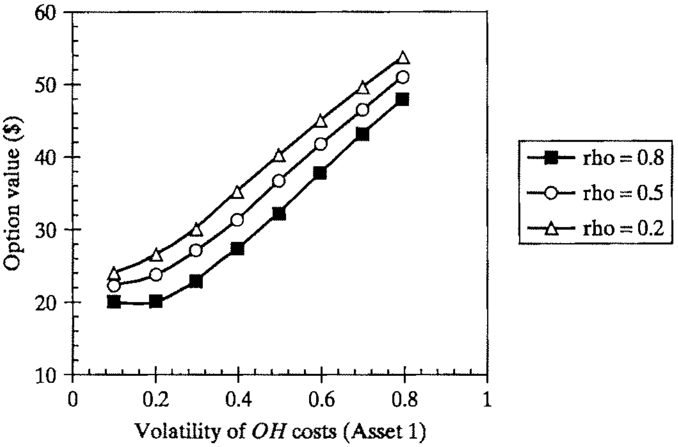
American option value (in units of Asset 1)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 38.935 |
| | | | | | | | | | 27.243 | |
| | | | | | | | | 18.974 | | 18.974 |
| | | | | | | | 13.126 | | 13.126 | |
| | | | | | | 8.990 | | 8.990 | | 8.990 |
| | | | | | 6.065 | | 6.065 | | 6.065 | |
| | | | | 3.997 | | 3.997 | | 3.997 | | 3.997 |
| | | | 2.534 | | 2.534 | | 2.534 | | 2.534 | |
| | | *1.499 | | 1.499 | | 1.499 | | 1.499 | | 1.499 |
| | 0.771 | | *0.767 | | *0.767 | | *0.767 | | *0.767 | |
| 0.393 | | 0.388 | | 0.380 | | 0.367 | | 0.339 | | *0.250 |
| | 0.193 | | 0.185 | | 0.171 | | 0.147 | | 0.094 | |
| | | 0.088 | | 0.078 | | 0.062 | | 0.035 | | 0.000 |
| | | | 0.035 | | 0.026 | | 0.013 | | 0.000 | |
| | | | | 0.011 | | 0.005 | | 0.000 | | 0.000 |
| | | | | | 0.002 | | 0.000 | | 0.000 | |
| | | | | | | 0.000 | | 0.000 | | 0.000 |
| | | | | | | | 0.000 | | 0.000 | |
| | | | | | | | | 0.000 | | 0.000 |
| | | | | | | | | | 0.000 | |
| | | | | | | | | | | 0.000 |

⇒ $31.452

FIGURE 4

OPTION VALUE AS A FUNCTION OF COST VOLATILITY



As in Figure 2, the 'early exercise barrier' is described by the starred *nodes. The option to outsource should not be exercised until this threshold is reached. At present, the option value is $31.452. By comparison, the expected present value of cost savings available from outsourcing is just $20, the difference between *IH* = $100 and *OH* = $80. To exercise now would mean a gain of $20 at the cost of an option worth $31.452, and hence a net loss. To avoid this mistake, the decision rule is to exercise only when the difference between *IH* and *OH* exceeds the option value, as occurs by definition at the early exercise barrier (i.e., at the starred *nodes only).

It is instructive to observe the effect of changes in input assumptions on the option value. For example, Figure 4 shows the American option value for a range of $v_{OH}$ values at given values of $\rho$, while holding $v_{IH} = 0.2$ and other inputs constant.

Note that the option value is higher the lower the correlation coefficient $\rho$—that is, the lower the correlation between the two cost streams. This is intuitively sensible, since the lower $\rho$ the greater the probability of *OH* costs increasing markedly relative to *IH* costs (with high correlation, they would likely move upwards together). Also note that the option value is very sensitive to the volatility of *OH* costs $v_{OH}$, even when the correlation between the two cost streams is high. Again this is sensible in that the higher the variance of the contractor's costs, the greater the probability of these moving steeply upwards in the future, and thus possibly far exceeding in-house costs.

## RECONCILIATION OF EPV AND RISK-NEUTRAL OPTION VALUATION

It is possible to derive the risk-neutral method of option valuation from within the more traditional EPV approach, the pivotal step being to recognize that the theoretically correct rate of return (discount rate) on an option is implied by the going market rate of return on the underlying asset. It was this crucial insight that essentially solved the option valuation problem for Black, Scholes and Merton (Bernstein, 1992, p. 217).

Consider a call option on an asset currently trading at $S$ and either increasing to $S_u$ or decreasing to $S_d$ at period end. The current market price of the underlying asset is given by its EPV as

$$S = \frac{\pi S_u + (1 - \pi)S_d}{1 + r_s} \tag{17}$$

where $\pi$ is the actual (subjective) probability of a price 'up', and $r_s$ is the market implied rate of return (expected return) on the stock.

Similarly, the expected present value of the call option is

$$C = \frac{\pi C_u + (1 - \pi)C_d}{1 + r_c} \tag{18}$$

where $C_u$ and $C_d$ are the 'up' and 'down' call values at period end and $r_c$ is the required rate of return on the call.

The problem at this point is that $r_c$ is unknown. To solve this problem imagine a hedge portfolio made up of $\Delta$ shares and one call option sold short, where $\Delta$ is fixed such that the period end value of the portfolio is certain (whatever the share price at that time). This is achieved by setting

$$\Delta = \frac{C_u - C_d}{S_u - S_d}. \tag{19}$$

As for any portfolio of shares and call options, the expected return on the hedge portfolio is the value-weighted average of $r_s$ and $r_c$. Moreover, because the hedge portfolio is designed to yield a certain (riskless) return, this expectation must equal the risk-free rate, $r$. Hence the 'arbitrage' condition, or more accurately 'no arbitrage' condition

$$\left(\frac{\Delta S}{\Delta S - C}\right) r_s + \left(\frac{-C}{\Delta S - C}\right) r_c = r \tag{20}$$

where $C$ is the value of the call option at period start, and $\Delta S - C$ is the aggregate value of the portfolio.

Solving equations (17)–(20) simultaneously, and defining a new term

$$p \equiv \frac{(1 + r)S - S_d}{S_u - S_d}$$

leads to the now well-known equation for binomial 'risk-neutral' option valuation

$$C = \frac{pC_u + (1 - p)C_d}{1 + r}.$$

It is possible to work back to $r_c$, using either (18) or (20), and thus to find $C$ explicitly in terms of EPV, but since this value is already found, there is no point in doing so. Option valuation explicitly by EPV is therefore redundant. The inherent computational advantage of the risk-neutral method is that it proceeds directly to $C$ without reference to either $r_s$ or $r_c$. In effect, it works as if both $r_s$ and $r_c$ equal $r$ (i.e., as if $\pi = p$), thus implicitly satisfying the arbitrage condition (20) without having to find the actual $r_c$ determined by the actual $r_s$.

The concept of risk-neutral valuation is often explained as one of imagining asset prices in a 'risk-neutral world', meaning a world where all assets, no matter how risky or riskless, yield the risk-free rate. This artificial assumption works because the combination ($r_s = r$, $r_c = r$) satisfies (20). Note that we could equally proceed as if we were in another perverse world, where say all stocks returned arbitrarily $r_s = 0.20$. The option price would then be calculated by its EPV using (18) where $r_c$ is whatever value satisfies (20) when $r_s = 0.20$. While there would be no mistake in this approach, it would be much more cumbersome because we would have to solve (18) and (20) simultaneously to find the necessary $r_c$ and resulting option value. The much more economical approach is to take both $r_s$ and $r_c$ as $r$. This combination satisfies (20) whatever the portfolio weights (i.e., whatever $\Delta$) and no additional calculations are needed. This is the advantage of a 'risk-neutral world'.

## COMPARISON WITH PRIVATE SECTOR PRACTICES

The costing-for-contracting guidelines promulgated by Australian and British governments prescribe a technical framework by which to make outsourcing decisions. They require agencies to project the two (or more) cost streams on offer, those of the in-house provider and the potential external contractor(s), and to compare their discounted present values. If the expected costs of the contractor (contract fees) are *currently* lower, in present value terms, than those of the internal provider, the requirement is to outsource.[5] The problem with this decision rule is that it ignores the value of the option to contract out, a 'real option' which is being exercised, and lost,[6] without having been priced or accounted for.

Although the literature on real options in capital budgeting is now extensive, a survey of financial managers in private sector industrial firms by Busby and Pitts (1997, p. 176) found that only a minority of firms have adjusted their capital budgeting techniques to make explicit allowance for 'real' or 'operating' options.

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[5] References include the guidelines of the NSW Premier's Department (1992, pp. 29–30), Queensland Treasury (1995, p. 30) and Department of Treasury Western Australia (1995, pp. 34–5). The same decision rule is set down in the British government's *Guide to Market Testing* published by the Efficiency Unit, Office of Public Service and Science (1993, pp. 75–7). See also Commonwealth of Australia (1997, p. 22), Department of Treasury and Finance Victoria (1997, Tool 17 Version 1.2), Office of the Auditor General Western Australia (1995, pp. 6–8).

[6] Explaining this loss, Aggerwal (1993, p. 27) writes: 'since an option can be exercised only once, a firm loses the value of the option to make the investment [outsource] later, once a decision has been made to make an investment [outsource]'.

However, notwithstanding little knowledge among respondents of real options methodology, Busby and Pitts (1997, pp. 170, 175, 181) found widespread intuitive acceptance of the existence and importance of such options in capital budgeting problems.

This intuition is presumably common to public sector managers as well, and indeed there are acknowledgments in the guidelines that government agencies may have something to lose in the way of managerial flexibility, and might leave themselves more exposed to financial and operating risk factors, when they dispense with their own employed functionaries in favour of contractors:

> The impact of possible reductions in flexibility and changes over time to competition in the private sector must also be considered. (Management Advisory Board, 1992, p. x)
>
> If there are very few competitors and council then loses its capacity to provide a service, it may become vulnerable to a private sector monopoly. Council may lose any benefits through monopolistic pricing and other behaviour. (Department of Local Government, 1997, p. 7)
>
> The major longer term risks of CTC [competitive tendering and contracting] are likely to be associated with knowledge transfer and skills issues. (Commonwealth of Australia, 1997, p. 6)

These are generally uncharacteristic qualifications in guidelines designed to promote and facilitate outsourcing.[7] Their appearance is a concession to the risk aspects of public sector agencies putting service functions (for which they remain ultimately responsible) in the hands of contractors driven by profit goals and not constrained by public service motives, and to the general difficulty of re-establishing in-house capabilities at acceptable cost.

Outsourcing decisions are ultimately justified by the need to be 'economically rational', to make the best possible use of scarce resources and to not allow inefficiencies or undue costs.[8] Genuine economic rationality, however, even in the narrow technical sense purported by the guidelines, demands that outsourcing decisions incorporate the risk of dismantling an in-house operation and giving away flexibility as more than a mere caveat to the main (financial) analysis. The lesson for those involved in these decisions emerging from the real options capital budgeting literature, is that the risk of exposure to contractor costs and the external market is something which should in principle be 'priced' and allowed for using the very same formal (NPV) valuation framework as has been used traditionally to value the more obvious financial aspects (e.g., projected cost savings) of the outsourcing alternative.

---

[7] 'In some fields (such as school cleaning) governments which have outsourced have simply created a series of regional monopolies in country areas. In part these outcomes were predictable given that the analysis undertaken by public sector agencies was crude, commercially naïve and pre-determined to recommend outsourcing. It is astonishing to find that governments have issued guidelines which reflect a lack of awareness of long term possibilities beyond a first outsourcing contract' (Walker and Con Walker, 2000, p. 179).

[8] The case for outsourcing is surveyed comprehensively by Domberger (1998).

One of the factors cited by Busby and Pitts (1997, p. 182) for the minority application of options-based capital budgeting among private sector firms is the general conceptual and mathematical complexity of options models. As a way by which financial managers might achieve the practical effect of an options model, Stark (1990, p. 175) notes an apparent tendency of managers in the private sector to apply discount rates well in excess of those emanating from the CAPM (systematic risk considerations) when evaluating possible capital investments. This is rationalized by the possibility that managers are rightfully cautious before tying up capital and in effect force acceptable projects to return in present value not just enough to cover their initial cost but enough in addition to cover the value of the option to 'wait and see' before investing (which is lost when an investment is made). Similarly, in relation to the opportunity cost of investing (not waiting), Pindyck (1988, p. 983) raises the possibility that by setting hurdle rates 'too high' managers might 'use the wrong method to get close to the right answer'.

An equivalent proposal in the context of contracting out is that decision makers should add a premium to the discount rate applied to the avoidable (through outsourcing) cost stream. The present value of avoidable costs must exceed zero before outsourcing can be warranted. If this present value is calculated at a discount rate including an 'options premium', then contracts will be awarded only when the NPV of avoidable costs measured at the conventional (opportunity cost of capital) rate exceeds not merely zero but some positive value ideally approximating the value of the option to contract out.

The weakness of this heuristic approach is in gauging an appropriate hurdle premium. Only very general guidance is possible. For example, it is sensible that in general the greater the degree of irreversibility, the more valuable the option to wait, and hence the bigger the hurdle premium. The premium should also increase with the uncertainty surrounding future contract fees, and with factors such as the length of the proposed contract (the longer the contract, the greater the possible changes in market conditions preceding contract re-negotiation, or possible re-establishment of the in-house function). There is, however, no rigorous mathematical basis on which a premium can be fixed without evaluating the option value directly. It is not possible therefore to evade the technical difficulties of the 'real options' literature without sacrificing some of the 'objectivity' of the NPV cost comparison framework. As usual in relation to subjective inputs, sensitivity analysis against different possible hurdle premiums is a possible practical remedy (e.g., it may occur that the decision to outsource stands over such a broad band of possible discount rates that there is no practical doubt about its optimality).

## CONCLUSION

It is risky to outsource just because the contractor's costs are somewhat lower on present expectations than those of the in-house provider. To justify irreversible or long term loss of its internal productive capability, an agency must be satisfied that any cost difference favouring the external provider is, for reasons of its current magnitude or otherwise, sufficiently unlikely to turn in favour of the in-house provider in future (i.e., soon enough to make a difference in present value terms). If the cost difference favouring the contractor is likely or even possibly transitory, then for the time being it may well be worth paying those marginally or even significantly higher costs of the in-house provider so as to keep open the possibility of staying with that provider in the long term:

> Facing a stochastic movement of project value, the manager should find the ability to 'wait and see' a highly desirable option. (Lee, 1988, p. 155)
>
> [O]ne of the most significant advantages of flexibility is to provide the production process with the ability to modify itself in the face of uncertainty. (Kulatilaka and Marks, 1988, p. 574)

In circumstances where outsourcing is for whatever economic or practical reason impossible or merely difficult (e.g., costly) to reverse, any additional cost of the in-house arrangement can be thought of and justified as an insurance premium, in the same way as the agency pays to insure against other potentially costly contingencies (e.g., fire).

In typical public sector capital budgeting contexts it is unlikely that the theoretical option price will be measurable accurately or reliably (cf. Pindyck, 1991, p. 1143). Unlike narrow applications such as corporate equity markets, where option prices are readily determined, there are usually not the required statistical inputs. In particular, stochastic models of the future costs of in-house and external service provision are bound to be tenuous and unreliable. It is possible, however, to learn from the mathematical theory of options pricing about the factors which make option values higher and lower. For example, it is well known in finance that the value of an option depends very largely on the *degree* of uncertainty surrounding the hedged variable (which, in this case, is the difference between the costs of in-house and external service provision). The greater this uncertainty, the greater the value of the option. This means, for example, that if there is much uncertainty concerning the size of contractor fees after (or even during) the original contract period, as might be the case when the contractor has no ready competitor constraining its contract renewal bid, then the option to contract out (and thus to not contract out) is all the more valuable and should be seen as such in any rigorous 'market testing' or compulsory competitive tendering process.

Undoubtedly, many managers within the public sector understand intuitively the value of unburned bridges. There may be profound strategic reticence, particularly in conditions of improbable or costly reversibility, towards contracting out, or towards making a hurried decision for current yet not necessarily lasting political reasons. The argument put in this article gives a 'rational economics' basis for such intuitively justifiable caution. Before a service function is contracted out, or privatized (the argument is the same), the agency has the option to maintain in-house service provision. After contracting out it does not. This option is a financial asset, much like an insurance policy, of obvious albeit not easily determinate financial value, and should be given up only for a price (expected cost saving) exceeding that value. It should certainly not be given up for nothing (cf. Edleson and Reinhardt, 1995, p. 251). This, however, is what in effect the various 'official' contracting-cost-comparison guidelines advocate. The fundamental insight ignored in these guidelines is that to justify irreversible action, the expected yet uncertain benefits must be of sufficient magnitude and reliability to warrant the risk that within some finite and possibly short time of having—without necessity—taken such action, managers might wish they were still in a position to choose.

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VIVIEN BEATTIE AND MICHAEL JOHN JONES

# The Impact of Graph Slope on Rate of Change Judgments in Corporate Reports

The use of graphs to disclose financial information in annual reports represents a significant dimension of financial disclosure management. Statistical graphics studies demonstrate that the accurate visual decoding of a graph is contingent upon the graph's *slope parameter*. This article reports two related studies into the slope parameter in a financial reporting context. A laboratory experiment indicates that sub-optimal slope parameters produce distorted judgments of corporate performance and an examination of the graphical formatting choices of 240 large U.K. companies indicates material departures from the optimal slope parameter. Policy implications are discussed.

**Key words:** Corporate annual reports; Graphical perception; Slope parameter.

## INTRODUCTION

The management of financial disclosure literature, much of which is based on positive accounting theory, emphasizes the motivations of management (see Watts and Zimmerman, 1986, 1990 for reviews). Company management 'have incentives to represent their company's performance in the best possible light' (Tweedie and Whittington, 1990, p. 97). As a result, the financial reporting process has been described as 'selective financial misrepresentation' (Revsine, 1991). Birnberg *et al.* (1983) identify biasing (selection of favourable signals) and focusing (enhancement/degradation of aspects of the information set) as types of information manipulation.

Early financial disclosure management studies found strong evidence of management action to influence the basic numbers (see, e.g., Schipper's 1989 review). Disclosure management also includes attempts to manage the *interpretation* and *presentation* of data, for example, by burying sensitive data or highlighting good news (Gibbins *et al.*, 1990, p. 129). Such interpretative shading, described as 'framing effects', has been shown to be very powerful in altering the meaning attributed by data users (Tversky and Kahneman, 1981; Bazerman, 1990). This finding extends to financial accounting contexts (Hofstedt, 1972).

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Gibbins *et al.* (1992, p. 22) acknowledge that the use of graphs to disclose financial information in annual reports could represent a significant dimension in financial disclosure management.[1] This is particularly true, given the modern, TV commercial, sound-bite philosophy where 40 per cent of readers spend less than five minutes reading the annual report (Squiers, 1989). Private stockholder surveys have shown that this group, which holds 50 per cent of common stock in the U.S. (Clarke and Bostock, 1997), rely on their own financial analysis of the annual report for investment decisions, rather than financial advisers. This self-reliance also seems to be increasing over time (Epstein and Pava, 1993). Moreover, non-expert users typically tend not to read the financial statements thoroughly, preferring to focus on the summary financial highlights (which are often presented in graphic form) and accounting narratives (Epstein and Pava 1993; Anderson and Epstein, 1996; Bartlett and Chandler, 1997). In these circumstances, there is clearly no time for detailed analysis and hence the view formed of the company's performance will be highly impressionistic. Graphs of financial information, which are visual and capable of rapid 'arm-chair' assimilation, may thus be displacing the use of other, less accessible, quantitative presentation formats in the annual report. Expert users do, however, undertake detailed analysis using the data contained in the financial statements (Lee and Tweedie, 1981; Arnold and Moizer, 1984). Yet they also review the entire annual report and thus their detailed analysis is 'framed' by the preceding graphic and narrative sections.

Regulators are now showing an increasing concern with the annual report package as a whole. For example, in the U.K., the Financial Reporting Council (1999) comments on the importance of the 'surrounds' to the financial statements and the Department of Trade and Industry (2000) has proposed that non-statutory information presented with the statutory information as part of the annual report be subject to an auditor's report. Recently, the U.K.'s Accounting Standards Board (ASB) issued a discussion paper that focuses on ways of improving communication with private shareholders. It recognizes that graphs are a powerful medium of communication and, drawing on suggestions in Beattie and Jones (1998), makes five recommendations regarding the use of graphs in annual reports. These cover selectivity in the graphs shown, selectivity in the length of time series shown, measurement distortion, the need for simple two-dimensional formats and the need for related commentary to be located adjacent to the graphs (ASB, 2000, pp. 28–9).

Presentation format (e.g., graphical versus tabular formats) has been identified as a key information processing variable (Libby and Lewis, 1977, pp. 246–7). The form of display organization and the prominence (i.e., salience) of visual cues clearly affects the way in which decision makers acquire and attend to information (Bettman and Kakkar, 1977; Jarvenpaa, 1989, 1990). However, no conclusion of general applicability has yet emerged since decision task is an important interacting and contingent variable (Blocher *et al.*, 1986; Kaplan, 1988; Sullivan, 1988; Davis, 1989; DeSanctis and Jarvenpaa, 1989). This article does *not* seek to explore the optimal presentational format in annual reports, but rather explores optimal graphical *form.*

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[1] Articles by Graves *et al.* (1996) and Preston *et al.* (1996) extend research into the annual report and accounts beyond its technical accounting components by examining pictorial material. They explore the representational, ideological and constitutive roles of images, thus recognizing that multiple interpretations are possible.

In external financial reporting, the communication of information, rather than the analysis of data, is the primary function of graphical display. Such displays potentially enhance communicative effectiveness, given the nature of human perceptual and cognitive processes. Graphs, particularly colour graphs, attract the reader's attention and the reader's memory recall ability is normally better for visual than for numerical or textual information (Leivian, 1980). However, an understanding of the basic principles of graph design and construction is required by preparers and readers if graphs are to exploit fully their communicative potential. Many private shareholders and financial analysts may not possess graphical competency skills. In such circumstances, design and construction issues become of particular importance. Taylor and Anderson (1986) demonstrate that U.S. loan officers gained a more favourable impression of corporate performance than was warranted from misleading graphs.

Importantly, '[i]nformed decisions about how to encode data can be achieved only through an understanding of the visual decoding process, which is called *graphical perception.* A display method that leads to inefficient visual decoding can prevent important aspects of data from being detected or can lead to distortions in the perception of information' (Cleveland, 1994, p. 20, emphasis in original). These distortions can be systematic. Simcox, for example, notes that graph designers can connotatively weight information 'by manipulating certain aspects of the graph' (1984, p. 486). Consequently, the financial graphs contained in corporate annual reports may be designed and constructed to portray performance favourably.

The emergent graphical perception theory provides the analytical basis for the study of graphical formatting choices in corporate annual reports. A series of studies covering several major countries has found that a significant number of financial graphs exhibited *measurement distortion* (i.e., the graph's physical measurement is disproportionate to the underlying numbers) (Steinbart, 1989; Beattie and Jones, 1992a, 1992b, 1996, 1998, 1999; Mather *et al.*, 1996, 2000; Courtis, 1997; Frownfelter and Fulkerson, 1998). Moreover, certain other design and construction features (e.g., graph type selected, use of background, directional ordering of time series) appear to be manipulated in order to present corporate performance in the best possible light (Beattie and Jones, 1992a, 1992b; CICA, 1993).[2]

A key feature of graph design which has, however, been neglected is the angle of the graph's trend line (termed the *slope parameter*). An increase in trend data can be represented graphically by a positive slope of between 0° and 90° (relative to the horizontal) by changing either the graph's height or width (or both). The ratio of graph height to graph width is termed the *shape parameter* or *aspect ratio*. Theoretical and experimental studies in graphical perception suggest that accurate judgments are critically dependent upon these two graphical attributes. Although the graphical dimensions accurately reflect the underlying numbers, perceptual impressions are inaccurate. Cleveland and McGill (1987, p. 198) comment on these parameters as follows: 'Their virtue is that *they can be manipulated by the maker of a graph*' (emphasis in original). They are, however, also potential vices, since they affect the judgment and hence interpretation of the data displayed. Graphic display designers can use such design features to 'invite the reader to draw inferences and to be sensitive to connotations that are not explicitly present' (Simcox, 1984, p. 483).

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[2] A number of these studies also investigate the issue of graph selectivity. A recent study by Beattie and Jones (2000) focuses exclusively on selectivity in a time series setting. The authors find that, at both the aggregate and individual company levels, the decision to use key financial variable graphs is associated positively with corporate performance measures and is consistent with the manipulation hypothesis.

To date, we are aware of no study which has investigated the impact of graphs contained in annual reports on the related financial judgment processes. In accounting, a variety of judgment processes are performed, depending on the user's needs and their level of financial expertise. Some judgments are formally defined tasks (e.g., the estimation of return, risk assessment, valuation), while others are informal (and perhaps subconscious; e.g., categorization and comparison tasks). These informal, perceptual judgment processes often precede more formal cognitive tasks. In annual reports, graphs typically provide a prominent display of precise, quantitative information that is also provided elsewhere in tables. Thus, the information processing of graphs is likely to rely on visual perceptual processing rather than highly cognitive processing.

The purpose of this article is to investigate graph slope parameters in the specific context of financial reporting. Such a study is innovative, in that it is the first study to undertake a behavioural experiment to investigate the magnitude of graphical effects on perceptions of corporate performance. All prior studies have been confined to documenting actual graphical reporting practices. Graphs are a particularly prevalent feature of modern financial reporting. For example, Beattie and Jones (1997) report that 92 per cent of U.S. and 80 per cent of U.K. leading companies present graphs in their annual report. The present study has four main objectives. First, we analyse the nature and importance of the shape and slope parameters by reviewing the relevant statistical graphics literature. Second, we develop an innovative research design that combines experimental and survey data in an interesting way. We use test materials based on actual financial data to investigate the effect of these parameters upon visual perception using specimen financial graphs in a laboratory setting. Third, we document and analyse the use of slope parameters in graphs of key financial variables in corporate annual reports, based upon a study of 240 U.K. companies' reports, to establish the incidence and magnitude of departures from the 45° optimal slope parameter. Fourth, we explore the relationship between financial performance and the slope parameter. The experimental and survey data relating to the second and third objectives are related, insofar as population data from annual reports are used to establish the range of experimental manipulations and, in turn, the experimental results are used to interpret the variation in the population data.

This article thus contributes to our understanding of alternative formats and displays in financial accounting, an area into which Swieringa (1996), a former member of the FASB, has called for more research. He observes that 'judgments about presentations of financial information are very difficult and research about alternative presentations would be helpful' (p. 5). Swieringa does not explicitly mention graphs, but they are a display format currently in common use.

The remainder of the article is presented in three major sections, followed by a summary and conclusion. The next section outlines relevant studies from the statistical graphics literature on the shape parameter and the visual perception of graph slope and develops two hypotheses. To our knowledge, there is no cognate accounting literature. Methods and results of the laboratory study follow, and we then outline the methods and findings of our empirical study on the use of the shape parameter in U.K. corporate annual reports.

## LITERATURE REVIEW AND HYPOTHESES

The key geometric components of rectilinear coordinate graphs, such as line and column graphs, are the scaled axes and the specifier (typically a column in a column graph) which encodes the data values. When graphs are read, the initial information processing activity is perceptual. Geometric aspects of the graph are judged during the first few seconds (Cleveland and McGill, 1987). Information is visually decoded without recourse to cognitive activities such as scale/label reading. Where the primary function of graphs is presentation, rather than analysis, the visual information processing of graphs is likely to be confined to such elementary perceptual tasks (Beattie and Jones, 1992b, p. 293). In a column graph (the graph type most commonly used to portray key financial variables in corporate annual reports), the *shape parameter* (or *aspect ratio*) can be defined as the height of the tallest column specifier divided by the total width spanned by all the column specifiers (Simcox, 1984, p. 487). Figure 1 illustrates an outline graph with a shape parameter of 0.86. When processing information encoded in rectilinear coordinate graphs, the slope (i.e., angle) of line segments is used to judge the rate of change. Research suggests that we 'mentally construct lines' between the tops of the columns in order to judge change (Hollands and Spence, 1992, p. 321). Of key importance, a change in the shape parameter of a graph changes the slopes of these line segments. The importance of the shape parameter lies in its effect on the reader's ability to accurately decode these slopes. The global *slope parameter* of a graph is the physical slope of the line joining the midpoints of the top of the first and last columns (in Figure 1 this is 0.17). This slope can also be defined as the line's angle with the horizontal (*orientation*), in this case 9.5°.[3] Readers judge these orientations in order to decode information about rate of change (Cleveland, 1994, p. 68).

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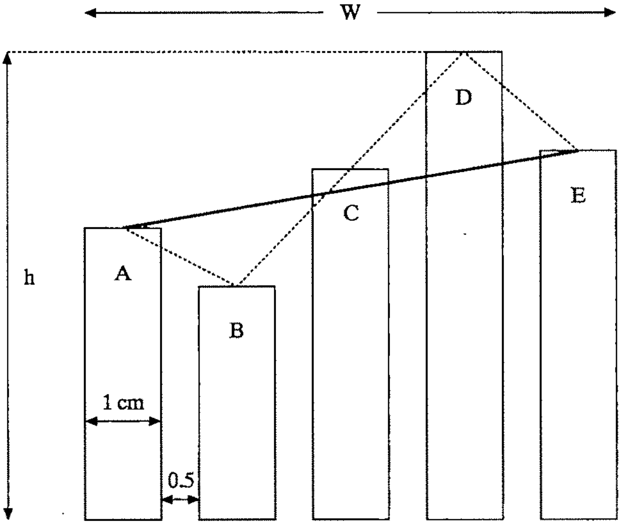
[3] Figure 1 provides a general illustration of the slope parameter and shows both positive (increases) and negative (decreases) slopes. This study focuses only on graphs with positive line segments.

FIGURE 1

ILLUSTRATION OF SHAPE PARAMETER AND ASSOCIATED GRAPH DESIGN FEATURES



The *shape parameter* (or *aspect ratio*) is the height of the tallest column divided by the width spanned by all the columns (*h*/*w*), which in this case is 0.86 cm (i.e., 6/7). Whereas the line segments on a line graph are explicit (or actual), those on a column graph are implicit. The dotted lines joining the midpoints of the tops of adjacent columns are termed *virtual line segments*. Their physical slope (angle orientation) is used to judge the *local* rate of change. Line segments AB and DE have negative slopes and line segments BC and CD have positive slopes. The global *slope parameter* of the graph can be measured in terms of the physical orientation (i.e., angle) of a line joining the midpoint of the top of columns A and E, which in this case is 1/6 = 0.17 or, expressed in degrees, arctan (1/6) = 9.5°.

Figure 2 further illustrates the relationship between graph shape and slope parameters with three outline column graphs each portraying the same five-year time series data. Graphs A, B and C have global slope (shape) parameters of 20° (0.62), 45° (1.71) and 70° (4.71), respectively.[4] The evidence from the statistical graphics literature suggests strongly that these three graphs, which encode precisely the same data, will convey very different impressions of the underlying trend, especially to the casual graph user. In particular, graph C is likely to be perceived as showing stronger growth than either graph A or graph B. Graph B is likely to be judged most accurately. Schmid (1983, pp. 28–9) emphasizes the importance of the shape parameter: 'grid proportions are of pronounced significance as the determinants of the visual impression conveyed'. Thus, it is important to determine the graph shape and slope parameters which will convey the most accurate impression, that is, the *optimal* parameters.

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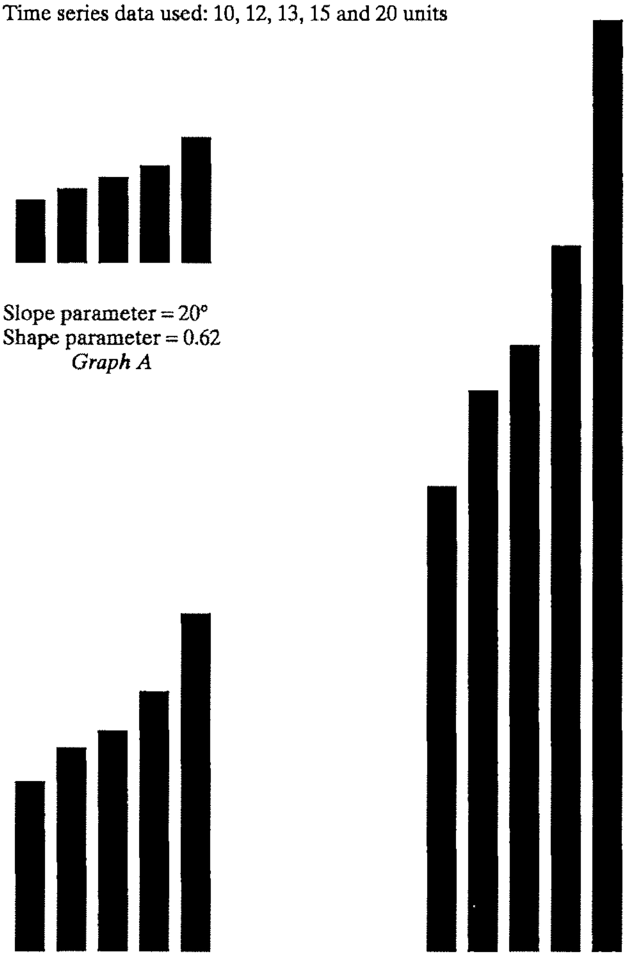
[4] Shape parameters have been varied by manipulating only graph height, rather than either graph width or both height and width.

FIGURE 2

THREE ILLUSTRATIONS OF THE RELATIONSHIP BETWEEN GRAPH SHAPE AND SLOPE PARAMETERS



Time series data used: 10, 12, 13, 15 and 20 units

Slope parameter = 20°
Shape parameter = 0.62
*Graph A*

Slope parameter = 45°
Shape parameter = 1.71
*Graph B (optimal)*

Slope parameter = 70°
Shape parameter = 4.71
*Graph C*

A vigorous debate took place throughout much of the twentieth century about the optimal shape parameter and whether it was a fixed ratio or data contingent.[5] A consensus now appears to have emerged that the optimal slope parameter is approximately 45° (Bertin, 1983, p. 178; Kosslyn, 1994, pp. 66–7), with the shape

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[5] Schmid (1983) and Tufte (1983) proposed a fixed ratio, while Von Huhn (1931) and Hall (1958) suggested that an optimal slope should determine the shape parameter.

parameter being contingent upon this (see, for an example, Figure 2, graph B). Studies by Cleveland and McGill (1987), Cleveland *et al.* (1988), and Cleveland (1993) use mathematics, the theory of visual perception, and controlled experiments to provide strong theoretical and empirical support for this fundamental principle of graph construction. The experiments employ highly abstract stimuli (typically pairs of line segments with positive slopes) with subjects being asked to judge the slope of one line as a percentage of the other.

Cleveland and McGill (1987) hypothesize that the accuracy of comparative slope judgments is maximized when the average angle of positively sloping line segments is at 45°.[6] Cleveland terms this averaging procedure for multiple segments 'banking to 45°' (1994, p. 70). Cleveland and McGill's (1987) experimental results reveal that an angle of +41.1° (approximating closely to the theoretical optimum) minimized the mean absolute judgment error and conclude that there was 'a decrease in error as the mid-angle gets closer to 45°' (p. 202). In other words, the accuracy of slope judgments increased as the slope approaches +45°. Cleveland *et al.* illustrate ineffective data displays where the slope parameter diverges from 45°, resulting in inaccurate and biased judgments by the graph reader. Such displays are described as exhibiting *orientation distortion* (1988, p. 293).

The importance of these findings becomes more apparent when viewed in the overall context of the graph reading process. In general, we do not store precise, quantitative information when reading graphs. Instead, we summarize the essence of the meaning by attaching a linguistic label (such as 'sharply increasing/decreasing') to the graphical information which places it in a specific conceptual category. This procedure allows us to generalize, to compare similar stimuli, and to avoid overloading our information processing system. The meaning of such linguistic labels can be defined empirically using *compatibility functions*, which locate an implied physical attribute in a corresponding conceptual category. Defined on the interval 0 to 1, 0 indicates no compatibility and 1 indicates complete compatibility. Simcox (1984) uses compatibility functions to map ranges of graph slope parameters for simple line and column graphs onto the conceptual categories 'slightly increasing' and 'sharply increasing'. He finds, for example, that a graph with a 30° slope is 37 per cent compatible with the conceptual category 'sharply increasing' whereas a 40° slope is 80 per cent compatible. Moreover, his results indicate that the slope of a line graph must be significantly greater than the slope of a column graph to achieve the same level of compatibility. This result may explain partially the high incidence of column graphs (and dearth of line graphs) used to display key financial variables in corporate annual reports (Beattie and Jones, 1992a), since a column graph will convey the same increasing data trend more favourably than a line graph. Thus, Simcox shows that the slope parameter mediates in the process of applying a linguistic label (conceptual category) to graphical information.

The accuracy with which financial information is decoded from graphs therefore depends fundamentally on the graph's slope parameter, rather than the shape parameter. The optimal slope parameter is 45° and determines the optimal shape parameter. The studies by Simcox (1984) and Cleveland and McGill (1987) provide the motivation and the theoretical basis of the present two-part study which focuses on the accounting domain. The laboratory study examines the effect of graph slope parameters on the conceptual categorization and perceptual accuracy of trend information concerning financial variables (the slope effect). Our hypotheses (stated in alternative form) are that, *ceteris paribus*:

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[6] The interested reader is referred to Cleveland and McGill (1984, 1985, 1987) for further detail.

H1: In a conceptual categorization task, graphs with larger slope parameters will be categorized as showing greater data increases, and

H2: In a comparison task, the graph showing the larger slope parameter will be perceived as showing the more favourable financial performance.

The empirical study of corporate practice investigates the extent to which graph design choices relating to the slope parameter are optimal.

## LABORATORY STUDY

### *Methods*

*Subjects and Stimuli* Fifty-three sophomore business studies students, who had completed a one-year course in accounting, participated in the two laboratory experiments, which were administered sequentially.[7] The experimental stimuli consisted of five-year, time series column graphs of the type commonly found in annual reports. The annual report graphs typically possessed neither a y-axis nor axis labels (see Beattie and Jones, 1992a, pp. 26–7, who report such findings in relation to axes and axes labelling for 154 key financial graphs). Further, only perceptual analysis of the graphs was required since, as argued above, this is the predominant form of processing employed in viewing annual report graphs. Therefore, scale values were omitted to discourage highly cognitive processing, following Simcox (1984).

A set of nine graphs was constructed to reflect each of three levels of two independent variables: slope parameter and overall data increase. All graphs were coloured black, to avoid any confounding perceptual effects relating to colour. Although our primary interest was in the effect of the slope parameter (slope effect) on the conceptual categories used, we introduced a data change effect (data effect) to act as a 'distractor', to minimize learning effects and to investigate the interaction, if any, between the 'slope effect' and the 'data effect'.

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[7] The studies concerning students as surrogates for managers produce mixed evidence. Whereas some studies show students to be poor surrogates (e.g. Abdel-Khalik, 1974), others such as Remus (1986) and Houghton and Hronsky (1993) are supportive of their use. Remus (1986) points out that a crucial distinction exists between attitudes and decision-making behaviour. While students and managers often have different attitudes, their decision-making behaviour 'often seems to parallel that of managers' (p. 20). He concludes that, in certain decision-making tasks, 'students with little business experience can be safely used as surrogates for managers' (p. 23). Ashton and Kramer (1980) reviewed decision-making studies and found considerable similarities between students and other groups. However, in our view, the experiment in this article has little if anything to do with *business* decision making, as the task merely requires subjects to apply their graph-reading skills. For this reason, it seemed inappropriate to enlist the cooperation of top managers or users of corporate reports.

The slope parameter levels were set at 30°, 45° (the theoretical optimum) and 70°. The choice of overall data increases was based upon the empirical distribution of the percentage change (over five years) in key financial variables (defined as sales, profit before tax, earnings per share [EPS], and dividends per share [DPS]) reported by the 240 U.K. companies in the second part of our study. The quartiles of this distribution were 61%, 111%, and 189%, and we approximated these values to 50%, 100%, and 200%. In each of the nine graphs, the overall data increase (50%, 100%, or 200%) increased monotonically. This was to ensure that all virtual line segments were positive since Cleveland and McGill's (1987) hypothesis relates only to positive line segments.[8]

### *Procedure*

Subjects were informed that the purpose of the experiment was to examine the effect, if any, of differences in graph structure on perceptions of the data portrayed and that all the graphs to be shown represented time series data of one of four key financial variables frequently reported graphically by companies. The graphic displays presented, and the experimental task, were intentionally kept abstract and simple, in order to focus on the impression conveyed from perceptual analysis of the graph's visual components, in particular graph slope. An example of the graphic displays was shown at the start of the experiment (Appendix A). The instructions to subjects were given in writing and were worded in as neutral a manner as possible in order to reduce the likelihood of subjects guessing the specific experimental hypothesis and answering in line with the researchers' expectations. Two experiments were conducted, comprising nine and thirty-six trials, respectively. On a given trial, the graphic display was projected on to an overhead screen for a fixed duration of three seconds. This short display time was selected, following Cleveland and McGill (1987), in order to prevent highly cognitive processing.

### *Experimental Tasks and Results*

*Experiment One: Categorization* Experiment one, designed to test H1, was a 3 × 3 factorial design with slope and data increases as the two independent variables taking the three previously explained values.[9] Subjects were shown each of the nine graphical stimuli in random order sequence and asked to select (by circling the appropriate response on a data collection sheet) the term which, in their opinion, best described the information portrayed. The five response categories were 'very slightly increasing', 'slightly increasing', 'moderately increasing', 'sharply increasing' and 'very sharply increasing', coded 1 to 5, respectively. Graphs with larger data increases were naturally expected to be categorized as showing greater data increases (the data effect).

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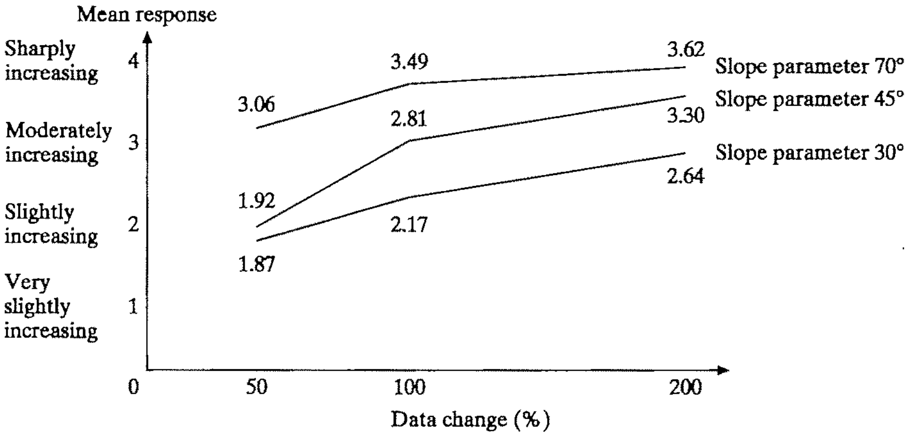
[8] After this experiment was conducted, Cleveland removed the restriction to positive line segments, arguing that the principle 'is a universal one' which 'applies to the judgment of orientation of any collection of line segments' (1994, 72).

[9] The shape parameter is not included as an experimental variable since the slope parameter and data values jointly determine the shape parameter.

FIGURE 3

EXPERIMENT ONE: ANOVA AND DATA CHANGE–RESPONSE FUNCTIONS



| | $F$ | $p$ |
|---|---|---|
| Overall model | 30.19 | 0.0001 |
| Slope parameter | 42.77 | 0.0001 |
| Data increase | 70.86 | 0.0001 |
| Interaction effect | 3.58 | 0.0069 |
| $R^2 = 0.34$ | | |

This experiment combines the idea of conceptual categories (Simcox, 1984) with the graph slope experiment of Cleveland and McGill (1987). It builds on Simcox (1984) by asking subjects to *select* (from a choice of five ordinal categories) the most appropriate conceptual category. By contrast, Simcox offers subjects a dichotomous choice, that is, whether or not they *agree* with a specified conceptual category. Moreover, we apply Simcox's abstract theoretical model to the real-world financial reporting context.

Analysis of variance (ANOVA) was used to analyse the results. The overall ANOVA model was significant ($F(8,468) = 30.19$, $p < 0.0001$), as were the two independent variables (slope and data increase, $p < 0.0001$) and the interaction effect ($p < 0.01$).[10] The model explained 34 per cent of the total variation in responses. The results are reported in Figure 3, which also illustrates the data change–response function for each level of slope parameter.

Figure 3 shows that, as expected, the overall mean response is higher for higher levels of data change, indicated by the upward slope of each of the three lines. As hypothesized, the higher slope parameters generally produce higher responses, at each level of data change. The 45° slope parameter gradient is the steepest. At this slope parameter, subjects perceived a 50 per cent data change to be 'slightly increasing' (mean response 1.92), whereas a 200 per cent data change was perceived as 'moderately increasing' (mean response 3.30). In comparison, perceptions of the 30° and 70° slope parameter graphs changed *less* substantively, from 'slightly increasing' (mean response 1.87) to 'slightly/moderately increasing' (mean response 2.64) and from 'moderately increasing' (mean response 3.06) to 'moderately/sharply increasing' (mean response 3.62), respectively. This implies that the subjects were better able to distinguish data variation at a slope parameter of 45°, which is consistent with the view that optimal judgments are made at this level (Cleveland and McGill, 1987). Tukey's studentized range (HSD) pairwise comparison procedure was used on the slope effect variable (SAS Institute, 1989, p. 222). A statistically significant difference existed between the means of the slope effects for each of the three pairs of data change levels (i.e., 50 per cent with 100 per cent, 50 per cent with 200 per cent, and 100 per cent with 200 per cent). Hypothesis H1 is thus supported. Graphs with larger slope parameters were categorized as showing greater data increases.

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[10] While the significance of the interaction term is markedly lower than either of the main effects, it nevertheless suggests that slope parameter and data change have a positive reinforcement effect.

### *Experiment Two: Comparison*

In experiment two, designed to test H2, each trial consisted of a pair of graphs. The nine graphs in experiment one generated thirty-six unique pairings in experiment two (ignoring identical pairs and the order of presentation). These thirty-six pairings were presented in random order. Subjects were informed that each pair of graphs represented two firms' (A and B) financial performance over time. Subjects were once more asked to indicate an appropriate response category. The five response categories were, 'A much more favourable than B', 'A more favourable than B', 'A and B equally favourable', 'B more favourable than A' and 'B much more favourable than A', coded 1 to 5, respectively. The graph showing the larger data increase was naturally expected to be perceived as showing the more favourable financial performance (the data effect).

This experiment involves a comparison task. We are aware of no other study of graphical perception that involves judgments of this or any other kind. In accounting decision making, inter-company comparisons are a common task.

Initial analysis of results using ANOVA showed the overall model of comparative judgments to be significant ($F = 5.65$, $p < 0.0001$), as were the two independent variables (slope difference and data difference) and the interaction effect (all at $p < 0.0001$). Thus, subjects' perceptions of the relative financial performance of the two firms was influenced by both slope parameter and data difference, both separately and jointly. Subsequent analysis uses paired comparisons to isolate the cause of these effects and explain the interaction effect. In particular, we sought to isolate the effect of the slope parameter upon perceptions.

The following three steps were carried out:

1. The thirty-six trials were organized into a triangular matrix (Table 1). The graph with the greater data increase is shown as graph A.

2. The nine critical trials which compare graphs with the *same data increases*, but different slope parameters were isolated. This tests the slope effect hypothesis (Table 2).
3. The nine trials where graphs A and B had the *same slope parameters*, but different data increases (termed trial group X), were matched with the eighteen trials where graphs A and B had identical slope and data changes to the graphs in trial group X, *except for graph B's slope parameter* (termed trial group Y). These matched trials allow the interaction of the slope effect and the data effect to be explored (Appendix B).

The responses for each of the thirty-six trials are shown in the form of a triangular matrix in Table 1. In nine trials, the data increases of graphs A and B were identical at either 50 per cent, 100 per cent or 200 per cent (one asterisk), in nine trials the slope parameters of graphs A and B were identical at either 30°, 45° or 70° (two asterisks), and in the remaining eighteen trials both the data increases and slope parameters of graphs A and B differed (no asterisks).[11] We have numbered the trials 1 to 36.[12] Mean responses (and standard deviations) are shown in the cells of Table 1. A mean response of three (the theoretical maximum in the absence of a slope effect) represents no difference in subjects' perceptions of the financial performance portrayed in the two graphs A and B. The expected mean responses will be three or less in all cases, since graph A has, in all cases, an equal or greater data increase than graph B (see footnote 11) and the data effect is hypothesized to dominate the slope effect. As the mean responses diverge from three, so the difference in subjects' perceptions increases. For example, a mean response of one would indicate that graph A was much more favourably perceived than graph B.

The mean responses reported in Table 1 are three or less, as expected, in thirty-two out of thirty-six trials, that is, graph A was perceived as more favourable than graph B.[13] The lowest mean response (of 1.98) occurs, as expected, in the bottom left hand corner cell where the two graphs are most different in both data and slope (graph A: 200 per cent, 70°; graph B: 50 per cent, 30°). In this case, both the data effect and the slope effect are at their greatest.

Within the thirty-six trials, there are nine critical trials where graphs A and B have the *same data increase*, but, crucially, have different slope parameters (indicated by one asterisk in Table 1). In the absence of both a data effect and a slope

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[11] To facilitate the presentation and analysis of our results, we have standardized responses on the basis that the graph showing the more favourable financial performance (i.e., the graph with the larger data increase) is presented first in Table 1 (graph A) (where data increases for both graphs were identical, the larger slope parameter is presented first).

[12] To achieve this, where the graph showing the more favourable financial performance was presented second, responses were recoded as '6 minus response', to maintain the 1 to 5 scale values, and the data change and slope parameters of both graphs were reversed.

[13] The four cases where the mean response is greater than three lie close to the main diagonal, where the data change and/or slope parameters of the two graphs are not markedly different. For example, trial 10, where the mean response was 3.08 (graph A: 100 per cent, 45°; graph B: 50 per cent, 30°).

TABLE 1

EXPERIMENT TWO: DESCRIPTIVE DATA ON THE 36 COMPARISON TASK TRIALS: STANDARDIZED MEAN RESPONSES (SD)

| | | | Graph B | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Data increase | | 50% | | | 100% | | | 200% | | |
| | | Slope parameter | 30° | 45° | 70° | 30° | 45° | 70° | 30° | 45° | 70° |
| Graph A | 50% | 30° | | | | | | | | | |
| | | 45° | $^{1}$2.85*<br>(0.63) | | | | | | | | |
| | | 70° | $^{2}$2.81*<br>(0.79) | $^{3}$2.94*<br>(0.74) | | | | | | | |
| | 100% | 30° | $^{4}$2.81**<br>(0.96) | $^{5}$3.00<br>(0.78) | $^{6}$3.02<br>(1.18) | | | | | | |
| | | 45° | $^{7}$2.40<br>(0.72) | $^{8}$2.70**<br>(0.75) | $^{9}$2.79<br>(0.96) | $^{10}$3.08*<br>(0.90) | | | | | |
| | | 70° | $^{11}$2.32<br>(0.89) | $^{12}$2.34<br>(0.82) | $^{13}$2.66**<br>(0.92) | $^{14}$2.55*<br>(0.89) | $^{15}$2.66*<br>(0.78) | | | | |
| | 200% | 30° | $^{16}$2.68**<br>(1.17) | $^{17}$2.60<br>(0.93) | $^{18}$3.00<br>(1.11) | $^{19}$2.58**<br>(0.77) | $^{20}$2.91<br>(1.00) | $^{21}$3.28<br>(1.34) | | | |
| | | 45° | $^{22}$2.34<br>(1.00) | $^{23}$2.40**<br>(1.05) | $^{24}$2.85<br>(1.13) | $^{25}$2.79<br>(1.03) | $^{26}$2.91**<br>(0.86) | $^{27}$3.08<br>(0.96) | $^{28}$2.71*<br>(0.77) | | |
| | | 70° | $^{29}$1.98<br>(1.08) | $^{30}$2.34<br>(1.14) | $^{31}$2.34**<br>(1.13) | $^{32}$2.45<br>(1.10) | $^{33}$2.45<br>(0.99) | $^{34}$2.83**<br>(1.03) | $^{35}$2.60*<br>(0.93) | $^{36}$2.56*<br>(0.96) | |

*Notes*: Nine graphs shown as pairs (A and B) to 53 subjects.

One (two) asterisks indicates trials where both graphs have the same data increase (slope parameter).

Response categories were: 1 = A much more favourable financial performance than B; 2 = A more favourable financial performance than B; 3 = A and B equally favourable financial performance.

The numbers in the top left hand corner of each cell represents a trial number, allocated for cross-reference with Table 2 and Appendix B.

TABLE 2

EXPERIMENT TWO: *T*-TESTS OF THE SLOPE EFFECT

| Trial no. from Table 1 | Data change | Graph A's slope parameter | Graph B's slope parameter | Difference in slope | *t*-statistic | Prob. |
|---|---|---|---|---|---|---|
| 1 | 50% | 45° | 30° | 15° | −1.738 | 0.044* |
| 10 | 100% | 45° | 30° | 15° | 0.614 | 0.271 |
| 28 | 200% | 45° | 30° | 15° | −2.679 | 0.005** |
| 3 | 50% | 70° | 45° | 25° | −0.553 | 0.291 |
| 15 | 100% | 70° | 45° | 25° | −3.157 | 0.001** |
| 36 | 200% | 70° | 45° | 25° | −3.328 | 0.001** |
| 2 | 50% | 70° | 30° | 40° | −1.748 | 0.043* |
| 14 | 100% | 70° | 30° | 40° | −3.707 | 0.000** |
| 35 | 200% | 70° | 30° | 40° | −3.112 | 0.001** |

* Significant at 0.05 (one-tailed).

** Significant at 0.01 (one-tailed).

*Note*: These data are based on 9 of the 36 trials where the data increase was common for graphs A and B (i.e., no data effect). The slopes of graphs A and B differed, thus enabling a direct test of the slope effect.

effect, the expected mean response will *equal* three. However, in the absence of a data effect and the presence of a slope effect, the expected mean response is *less than* three. *T*-tests were performed to ascertain whether or not differences in slope parameter had indeed caused differences in the perception of financial performance (i.e., mean response significantly less than three). The results are shown in Table 2. Mean responses were below three at the 0.01 significance level in five out of nine trials, and below three at the 0.05 significance level in a further two trials, consistent with the presence of a slope effect. Interestingly, the greater the difference in slope parameter, the greater the slope effect. Four of the five most significant *t*-tests occurred for slope differences of 25° and 40°. Thus hypothesis H2 is supported. Graphs showing larger slope parameters were perceived as showing the more favourable financial performance. In addition, these results indicate that the slope effect appears to be strongest at the higher levels of data change. For example, three out of the five instances of 0.01 level significance occur when the data change was 200 per cent. Thus, the slope effect and the data effect are mutually reinforcing.

The results from experiment two were rearranged into eighteen (two sets of nine) planned matched trials, with each trial, X and Y, constituting a comparison of two graphs, A and B (see Appendix B). The trials were matched in such a way that, although graphs A and B portrayed *different* data changes, the data changes involved in trials X and Y were identical. The slope parameter for graph A was also identical in both trials. The critical point of difference between the two trials was, thus, the slope parameter of graph B. This allowed us to investigate the interaction of slope and data effects.

In seventeen out of eighteen comparisons, we found a slope effect, with nine out of the eighteen mean differences being significant. Four of the significant comparisons occurred where the slope parameter difference between graphs A and B was at the *maximum* absolute level of 40°, and a further three occurred at the 25° absolute level. In addition, three of the significant comparisons occur where the data change difference was at the *minimum* level of 50 per cent. These results suggest that the strength of the slope effect is related directly to the slope parameter differential and weakly inversely related to the data change differential.

The finding that the slope effect is related directly to the slope parameter difference provides evidence, in addition to experiment one, that the slope parameter affects judgments of financial performance. The additional finding that this influence decreases as the data change difference increases provides evidence of a key contingent variable. Thus, we should be most concerned about the impact of variation in slope parameters in comparison tasks involving similar trends. Given that companies' performance trends tend to move together, due to the influence of the economic cycle, this situation is likely to be encountered frequently. So, if company A and company B both perform similarly over a five year period, and company A graphs this trend with a slope parameter of 70° while company B uses 30°, then performance will be *perceived* as quite different, even though they are, in fact, very similar.

## CORPORATE PRACTICE

### *Descriptive Data*

*Methods* Two hundred and fifty companies were sampled (by selecting every second company) from the largest 500 listed U.K. companies as at 31 March 1989. The corporate annual reports of 240 of these companies were obtained.[14] These reports contained 456 graphs of key financial variables.[15] The vast majority of graphs (90 per cent) were of the generic column type (i.e., columns, symbols used as columns, or lines). Bar graphs were excluded from the analysis as the concept of slope parameter is not meaningful for them, leaving 410 graphs. Each of these key financial graphs was measured to enable the calculation of the slope parameter. We restricted our analysis of the slope parameter to the 89 per cent of cases (364 graphs) where all the virtual line segments were positive, since Cleveland and McGill's (1987) original hypothesis and experimentation relates only to positive line segments.

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[14] Seventy-nine per cent of the 240 reports examined had graphs, the average number of graphs being 5.9; 65 per cent of the 240 reports had graphs of one or more of the key financial variables.

[15] Seventy-two per cent of the graphs showed a five-year trend. Nineteen graphs had non-zero intercepts. Nine graphs whose specific design features rendered the shape and slope parameters either immeasurable or meaningless (e.g., zero base line obscured, bar graph, pictogram) were eliminated from the analysis. The graphs studied were spread fairly evenly across the four key financial variables: 20 per cent were sales, 28 per cent profit before tax, 27 per cent EPS, and 25 per cent DPS. Graphs of these topics were selected because they were the most frequently reported aggregate *financial* performance variables, representing 31 per cent of all graphs; a further 28 per cent were graphs of segmental data, with the remaining 41 per cent covering a wide range of financial and non-financial measures.

TABLE 3

FREQUENCY DISTRIBUTION OF KEY FINANCIAL VARIABLE GRAPHS' SLOPE PARAMETERS

| | Sales | Profit before tax | EPS | DPS | Total | | Below median data change | | Above median data change | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | No. | No. | No. | No. | % | No. | % | No. | % |
| 80° to ≤ 90° | 1 | 2 | 2 | 2 | 7 | 2 | 4 | 2.2 | 3 | 1.6 |
| 70° to ≤ 80° | 3 | 3 | 3 | 3 | 12 | 3 | 5 | 2.7 | 7 | 3.8 |
| 60° to ≤ 70° | 7 | 19 | 16 | 9 | 51 | 14 | 20 | 11.0 | 31 | 17.0 |
| 50° to ≤ 60° | 16 | 17 | 13 | 9 | 55 | 15 | 23 | 12.6 | 32 | 17.6 |
| 40° to ≤ 50° | 10 | 23 | 14 | 18 | 65 | 18 | 36 | 19.9 | 28 | 15.5 |
| 30° to ≤ 40° | 16 | 16 | 20 | 18 | 70 | 19 | 36 | 19.8 | 34 | 18.7 |
| 20° to ≤ 30° | 9 | 10 | 16 | 20 | 55 | 15 | 27 | 14.8 | 28 | 15.4 |
| 10° to ≤ 20° | 8 | 7 | 7 | 17 | 39 | 11 | 25 | 13.7 | 14 | 7.7 |
| 0° to ≤ 10° | 1 | – | – | 9 | 10 | 3 | 6 | 3.3 | 5 | 2.7 |
| Total | 71 | 97 | 91 | 105 | 364 | 100.0 | 182 | 100.0 | 182 | 100.0 |

Mean angle 43° 47° 44° 36° 42.3°

Standard deviation 17.0° 15.9° 17.0° 19.1°

*Results and Discussion*

Although the mean slope parameter (see Table 3) conformed closely to the proposed optimal overall graph slope of +45° (Cleveland and McGill, 1987; Cleveland *et al.*, 1988), dispersion was wide, indicating extensive and significant departures from the optimum. The mean overall slope parameter of the 364 graphs was +42.3°. The frequency distributions for sales, profit before tax, and EPS were similar (and exceedingly close to the 45° optimum); the distribution for DPS graphs was lower at +36°. Only 65 (17.9 per cent) of the slope parameters were in the band 40° to 50°, i.e., within 5° (equivalent to 11 per cent) of the optimal overall slope parameter. Moreover, 174 graphs (47.8 per cent) deviated more than 15° from the optimal overall slope parameter. Turning to the individual key financial variables, profit before tax graphs showed the least dispersion from 45°, while DPS graphs showed the most. Therefore although, *on average,* graphs of key financial variables display slope parameters approximating to Cleveland and McGill's (1987) optimal slope of 45°, the majority of *individual* graphs depart materially from this value. Such extreme slopes impair users' judgmental accuracy and hence their ability to correctly evaluate trend data.

The final four columns of Table 3 report separate analyses for companies with below and above median data change for the key financial variables. As would be expected, companies with below average performance trends generally have graphs with lower slope parameters and vice versa. However, many high performing companies use *below* median graph slopes, suggesting *prima facie* that a significant proportion of companies either do not control the slope parameter or do not understand its impact.

We explored both the overall association between financial performance and the slope parameter and the association for separate groups of 'poor' performance companies and 'good' performance companies, since the strength of the incentives to manipulate the slope parameter is expected to be greater for the poor performance group. The overall association was investigated for each of the four key financial variable column graphs where *all* virtual line segments were positive, by calculating the trend (percentage increase) in the key financial variable. As expected, we observed an overall positive relationship between the slope parameter and the percentage increase in the time series data (since greater data increases result inevitably in higher slope parameters if the same graph scales are used). The correlations for the sales and DPS variables were statistically significant at the 5 per cent level.

To see if the relationship between the data change and the slope parameter differed between the two performance groups, we split the graphs relating to each key financial variable into two sub-groups, based on the median data trend for that variable, and fitted a simple OLS regression model relating graph slope parameter (dependent variable) to data trend for each sub-group. In the case of all four key financial variable graphs, the slope of the regression line is greater for the 'poor performance' (i.e., below the median data trend) sub-group. The profit before tax and DPS regression slope coefficient estimates for the poor performance sub-group were significant at the 5 per cent level and for sales was significant at the 10 per cent level (i.e., there was a significant positive relationship between data increase and slope parameter). No significant regression slope coefficient estimates were found for the above median sub-group (i.e., there was no significant positive relationship between data increase and slope parameter). Thus, although poor performance is associated with a lower *absolute* slope parameter than good performance, the relationship is not uniformly linear. In essence, poor performance graphs have slope parameters which are higher *relatively* than those of good performance graphs.

Our findings concerning the wide variation in slope parameters in practice can be partly explained by the custom of using, as far as possible, standard proportions for the graphs of all key financial variables, especially when they are grouped together on a page. This design strategy, which gives a symmetrical visual impact, appeals to the eye. Thus graphs of the same width, and where possible the same height, are constructed by scaling the key financial variable to accommodate the data. Typically, sales, profit before tax, and EPS each use different scales (for example, $million, $000, and cents), thus facilitating graphs of equal height.

Unfortunately, this design strategy impairs communicative effectiveness, since all key financial graphs will have the same shape parameter. Associated slope parameters therefore vary depending on the data values. This may explain the observed high degree of dispersion in slope parameters. In the case of DPS, however, the unit of measurement is normally the same as that for EPS (indeed, commonly both variables appear on the same graph). Consequently DPS graphs will inevitably have smaller slope parameters than EPS graphs, since DPS is normally smaller than EPS.

## SUMMARY AND CONCLUSIONS

Research in statistical graphics provides theoretical and empirical support for the view that the judgmental accuracy of physical slopes is maximized at 45°. This value, in conjunction with the data values to be portrayed, determines the optimal shape parameter. Typically, experimental studies have used highly abstract test materials. In this article, the results of a laboratory study using realistic graphic stimuli provide strong evidence that, in the context of financial performance evaluation tasks, graph slope significantly affects both the specific conceptual categories which are used in reading graphs and the accuracy of comparative judgments. Our findings therefore contribute to the study of alternative presentations in financial reporting, indicating that sub-optimal slope parameters may produce distorted judgments of corporate financial performance by users. In particular, financial graphs with large slope parameters are likely to be perceived as portraying stronger growth than those with small slope parameters. Future research that varies design and construction characteristics of the graphs (e.g., use of labels, convexity/concavity of trend line) and the processing time allowed is required to assess the sensitivity of our results to different graphical scenarios.

Most large companies present graphs prominently in their corporate annual report and graphs are an important and potentially effective means of communicating financial information. Our empirical study of corporate practice reveals, however, that the majority of key financial graphs contained in corporate annual reports exhibit slope parameters which depart materially from the optimum. This finding is attributed partly to the use of design strategies which conflict with the use of the optimum slope parameter. Users' perceptions of corporate performance are thus likely to be distorted.

Given the significant distortion in perceptions that arises from sub-optimal slope parameters, we would recommend that regulations (or at least guidelines) be introduced to limit permitted slope parameters to an acceptable range (i.e., to prohibit extreme slope parameters that produce distorted judgments). Regulators in the U.K. have recently shown a willingness to endorse recommendations of this type (ASB, 2000, pp. 28–9).

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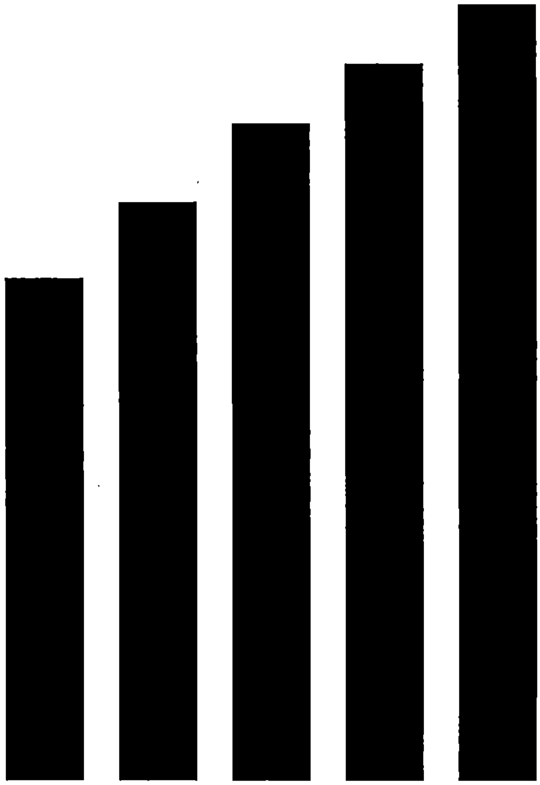
## APPENDIX A

## SAMPLE COLUMN GRAPH USED IN THE EXPERIMENT



## EXPERIMENT TWO: *T*-TESTS OF 18 PLANNED MATCHED TRIALS BETWEEN TRIAL GROUP X (NO SLOPE EFFECT) AND TRIAL GROUP Y (SLOPE EFFECT), WITH DATA CHANGES HELD CONSTANT[a]

| Column 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Common data for both trial groups X and Y | | | Data differs | | | | | Test statistics | | |
| | | | | | Trial group X | Trial group Y | Trial groups X and Y | Trial group Y | | | | |
| | | Graph A | | Graph B | Graph B | Graph B | | | | | | |
| Comparison no. | Comparison of trial nos. (trial group X stated first) (from Table 1) | Data change | Slope parameter | Data change | Slope parameter | Slope parameter | Common data change difference (graph A–graph B) (col.3–col.5) | Slope parameter difference in trial Y (graph A–graph B) (col.4–col.7) | Mean response difference (trial X–trial Y)[b] | *t*-statistic | Expected sign of mean difference | Prob. |
| 1 | 4&5 | 100% | 30° | 50% | 30° | 45° | 50% | –15° | –0.189 | –1.278 | – | 0.103 |
| 2 | 19&20 | 200% | 30° | 100% | 30° | 45° | 100% | –15° | –0.377 | –2.266 | – | 0.013* |
| 3 | 16&17 | 200% | 30° | 50% | 30° | 45° | 150% | –15° | 0.075[c] | 0.496 | – | 0.310 |
| 4 | 8&7 | 100% | 45° | 50% | 45° | 30° | 50% | 15° | 0.302 | 2.934 | + | 0.002** |
| 5 | 26&25 | 200% | 45° | 100% | 45° | 30° | 100% | 15° | 0.056 | 0.323 | + | 0.374 |
| 6 | 23&22 | 200% | 45° | 50% | 45° | 30° | 150% | 15° | 0.132 | 0.980 | + | 0.166 |
| 7 | 8&9 | 100% | 45° | 50% | 45° | 70° | 50% | –25° | –0.151 | –1.033 | – | 0.153 |
| 8 | 26&27 | 200% | 45° | 100% | 45° | 70° | 100% | –25° | –0.170 | –1.137 | – | 0.130 |
| 9 | 23&24 | 200% | 45° | 50% | 45° | 70° | 150% | –25° | –0.377 | –2.017 | – | 0.024* |
| 10 | 13&12 | 100% | 70° | 50% | 70° | 45° | 50% | 25° | 0.453 | 2.946 | + | 0.002** |
| 11 | 34&33 | 200% | 70° | 100% | 70° | 45° | 100% | 25° | 0.377 | 2.430 | + | 0.009** |
| 12 | 31&30 | 200% | 70° | 50% | 70° | 45° | 150% | 25° | 0.000 | 0.000 | + | 0.500 |
| 13 | 4&6 | 100% | 30° | 50% | 30° | 70° | 50% | –40° | –0.208 | –1.261 | – | 0.101 |
| 14 | 19&21 | 200% | 30° | 100% | 30° | 70° | 100% | –40° | –0.755 | –3.650 | – | 0.000** |
| 15 | 16&18 | 200% | 30° | 50% | 30° | 70° | 150% | –40° | –0.321 | –1.553 | – | 0.063 |
| 16 | 13&11 | 100% | 70° | 50% | 70° | 30° | 50% | 40° | 0.340 | 2.475 | + | 0.008** |
| 17 | 34&32 | 200% | 70° | 100% | 70° | 30° | 100% | 40° | 0.377 | 2.360 | + | 0.011* |
| 18 | 31&29 | 200% | 70° | 50% | 70° | 30° | 150% | 40° | 0.358 | 2.657 | + | 0.005** |

[a] Columns 3–5 present the three data items that are common to trial groups X and Y. Columns 6–7 highlight the differing slope parameters for graph B, the critical point of difference between the two trial groups X and Y. Column 8 shows the data change difference between graphs A and B common to both trial groups (col.3 less col.5), while column 9 indicates the slope parameter difference between graphs A and B for trial group Y (col.4 less col.7). Finally, columns 10–13 present the test statistics. The results are ordered in increasing absolute slope parameter difference order (see col.9).

[b] In a few cases, the mean response differences vary from those deducible from Table 1 due to the different treatment of missing values.

[c] Not in the expected direction.

* Significant at 0.05 level (one-tailed); ** Significant at 0.01 level (one-tailed).

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# Is Index Performance Achievable? An Analysis of Australian Equity Index Funds

This article examines the performance of index equity funds in Australia. Despite the significant growth in index funds since 1976, when the first index mutual fund was launched in the U.S., research on their performance is sparse in the U.S. and non-existent in Australia. This study documents the existence of significant tracking error for Australian index funds. For example, the magnitude of the difference between index fund returns and index returns averages between 7.4 and 22.3 basis points per month across index funds operating for more than five years. However, there is little evidence of bias in tracking error implying that these funds neither systematically outperform nor underperform their benchmark on a before cost basis. Further analysis provides evidence that the magnitude of tracking error is related to fund cash flows, market volatility, transaction costs and index replication strategies used by the manager.

**Key words:** Benchmark index; Index fund; Investment performance; Tracking error.

Literature based on U.S. markets widely confirms the inability of active mutual funds to outperform passive benchmarks or indices such as the S&P 500 (Jensen, 1968; Grinblatt and Titman, 1989; Elton *et al.*, 1993; Malkiel, 1995; Gruber, 1996; Carhart, 1997; Edelen, 1999). The findings of Australian studies are consistent with the U.S. evidence (Bird *et al.*, 1983; Robson, 1986; Hallahan and Faff, 1999; Sawicki and Ong, 2000). Unlike active funds, which aim to *outperform* their benchmark index, passive or index funds aim to *replicate* the performance of the benchmark.

While prior research on the performance of active investment funds is extensive, there exists a critical gap in the literature with respect to the performance of passive funds. Such literature is limited to Gruber (1996) and Frino and Gallagher

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(2001).[1] Gruber (1996) examines the performance of a sample of U.S. index funds between 1 January 1990 and 30 December 1994, and documents that they underperform the index by approximately 0.202 per cent per annum on an after-cost and risk-adjusted basis. Frino and Gallagher (2001) extend the analysis to a sample of forty-two U.S. index equity funds between 1 March 1994 and 28 February 1999, and document that they underperform the index by approximately 0.29 per cent per annum on an after-cost and risk-adjusted basis, and the magnitude of the difference between index fund performance and their benchmark averages between 0.039 and 0.110 per cent per month before costs. The main objective of this study is to extend previous research by examining the performance of Australian equity index funds. This is achieved by evaluating both the magnitude and determinants of index fund tracking error. An analysis of index fund performance is important as it provides investors with direct evidence concerning the ability of managers to replicate the index as well as determining the success or otherwise of passive managers in meeting their performance objectives.

Since the aim of index funds is to replicate the performance of an index, then the difference between the return on a benchmark index and return on an index funds' portfolio (or *tracking error*) can be used to evaluate their performance. Tracking error in the performance of index funds is likely to arise from the difficulties inherent in management of passive portfolios. Theoretically, the management of an index portfolio is straightforward, requiring passive fund managers to hold each constituent index security in the same proportion to the benchmark (known as a 'full replication' strategy). In reality, index funds will experience considerable difficulty in replicating the target index, because the index represents a mathematical calculation that does not take into account market frictions. For example, index funds must physically transact in index securities in order to replicate the returns of the benchmark, thereby incurring transaction costs and imparting price pressure. However, the calculation underlying the index assumes costless re-balancing may occur at any time at prevailing market prices.

Chiang (1998) identifies that transaction costs, index composition changes, corporate activity, fund cash flows, index volatility and the reinvestment of dividends are the main factors which give rise to tracking error in index fund performance. The existence of these factors is the main motivation for the research reported in this article. The primary aim of this research is to document the magnitude of tracking error in the returns generated by Australian equity index funds as a consequence of these factors. This research also extends previous U.S. research by assessing the significance of these factors in explaining the magnitude of tracking error.

In the U.S. the first index mutual fund was launched in 1976 by Vanguard Group Inc. However, it has only been in the last decade that indexing has grown significantly (Gruber, 1996; Frino and Gallagher, 2001). In Australia, indexing has also grown substantially in terms of the size of funds under management. The amount of assets passively managed by Australian institutions as at September 2000 was reported by Rainmaker Information to be around $A75.9 billion, or 11 per cent of the Australian investment management industry (Rainmaker Information, 2000). In addition, an April 2000 survey by one the Australian superannuation industry's journals, *Superfunds*, reported total assets indexed was around $A57.4 billion, representing an increase of 42 per cent since the previous year.[2] The research reported in this article is therefore also motivated by the significance and growth of index funds in Australia.

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[1] While evidence on the performance of index funds is limited to Gruber (1996) and Frino and Gallagher (2001), Sinquefield (1991) and Keim (1999) examine the design of small-capitalization index funds, while Horan (1998) examines the types of fund assets likely to use index investment products.

While the primary aim of this study is to provide an understanding of the difficulties and performance of a relatively new and increasingly popular type of investment fund *per se*, the analysis also provides evidence relevant to two other issues in the funds management performance evaluation literature. To date, the literature documents that active funds do not outperform appropriate benchmark indices, and suggests passive funds represent an appropriate alternative (e.g., Malkiel, 1995; Elton *et al.*, 1996). However, this argument assumes that index funds are able to achieve their performance objectives. Given the difficulties faced by index funds, and the likelihood of tracking error, this study provides new evidence relevant to assessing the merits of an active versus passive investment strategy.

The performance evaluation literature also identifies the importance of employing appropriate benchmark indices in the evaluation of fund performance. For example, Elton *et al.* (1993) show Ippolito's (1989) findings of superior performance for active U.S. mutual funds is attributable to an incorrectly specified benchmark. If index funds exhibit significant tracking error, then this implies that replication of index returns is problematic. This in turn may cast doubt on the appropriateness of an index as a technical benchmark in performance evaluation. The results of this study are also relevant to this issue.

## THEORY

The objective of a passive or index fund is to replicate the return on a benchmark index. This is typically achieved by an investor holding all securities comprising the benchmark index in their exact same proportions (full replication strategy) or holding a portion of the theoretical portfolio of securities underlying the benchmark index that mimics the returns on the index (i.e., a stratified sampling or optimization strategy). An index is an arithmetic calculation measuring changes in the value of a group of securities within a particular asset class. The calculation of an index ignores market frictions in the sense that when the security weights within the index change, the index implicitly assumes that re-balancing of securities to reflect the new market weights can occur costlessly, instantaneously and at prevailing market prices. However, index funds face a number of market frictions in attempting to mimic the index portfolio, or more specifically, returns on the index. These frictions can ultimately result in tracking error.

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[2] *Superfunds*, August 2000, Vol. 239, pp. 13–18. The percentage increase in the year to 1999 was 65 per cent, and 90 per cent of all indexed assets were invested in the Australian and international equity asset classes.

Chiang (1998) identifies that transaction costs, client related cash flows, the treatment of dividends within the index, the volatility of the benchmark and changes in the composition of the index may all contribute to tracking error. Tracking error may also differ across index funds as a consequence of the portfolio strategy adopted in attempting to replicate the performance of the index. Each of these factors is discussed below.

Explicit costs associated with trading in securities markets, including brokerage fees and stamp duty, can influence the ability of passive funds to replicate index performance. The index itself is calculated as a 'paper' portfolio, which assumes transactions can occur costlessly (see Perold, 1988). In reality, passive funds incur explicit costs associated with transactions relating to client capital flows. For example, cash flow movements cause flow-induced trading for passive funds, requiring new cash to be invested across index securities or part of the portfolio to be liquidated. Apart from cash-flow induced trading, index funds also trade regularly for a variety of other reasons associated with strategy implementation. Because index funds are required to trade, explicit transaction costs are incurred. These costs erode the value of the index fund by the amount of the explicit costs and lead to tracking error in performance measured after management expenses.[3]

Funds also incur implicit transaction costs in trading, including bid–ask spreads and the price impact of trading (Perold and Sirri, 1994). These will also cause tracking error in performance measured before management expenses. Transactions by passive funds can cause temporary demand and supply imbalances, which implies that they are not able to trade instantaneously at prevailing market prices (Chan and Lakonishok, 1993; Perold and Sirri, 1994). Overall, this implies that client related cash-flow movements and the implicit costs of trading, such as bid–ask spreads, are likely to be related to the magnitude of tracking error.

Another factor likely to be related to tracking error is the volatility of the underlying benchmark index. If the composition and weighting of stocks held by an index fund perfectly match those of the index, changes in the value of the index fund portfolio should match changes in the benchmark index. However, at any point in time, the composition of the portfolio of a passive fund is unlikely to be perfectly aligned with the index portfolio for a number of reasons. For example, most index fund managers are likely to use some form of proxy portfolio because the smaller, less liquid, stocks in the underlying index are more difficult to acquire. Other funds explicitly aim to hold an imperfect proxy portfolio with the objective of minimizing the costs of assembling a portfolio to track the underlying index. New client cash inflows may also take time to be invested in the funds' desired portfolio, especially those involving less liquid stocks. As a result, unsystematic movements in the stocks underlying an index that are not in a passive fund manager's portfolio will result in tracking error. Similarly, unsystematic movements in the overweight stocks in a fund manager's portfolio relative to the index portfolio will also cause tracking error. Consequently, higher benchmark index volatility is likely to be associated with higher tracking error.

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[3] Management expenses cover costs incurred by the fund manager associated with custodian services, trading and administration. They also include the profit earned by the fund manager.

Tracking error can also arise from dividends paid by stocks in the index. When a listed company in an index goes ex-dividend, the index effectively assumes that the dividend is re-invested in the stock from which it is derived on the ex-dividend date. However, investors (including passive funds) experience a significant time delay, which normally extends into weeks, in receiving cash in relation to a dividend. As a consequence, tracking error can occur for two reasons. First, there are transaction costs associated with re-investing the dividends once received, and these erode the value of the passive funds portfolio. In contrast, the index assumes that the proceeds from the dividend payment are re-invested costlessly at the prevailing market price. Second, the fund manager must wait for receipt of cash in relation to dividends prior to being able to re-invest it. Hence, there is likely to be a positive relationship between the level of dividends paid by stocks in an index and passive fund tracking error.

Tracking error may also be related to changes in the composition of the benchmark index. These include periodical index adjustments related to company additions and deletions, capitalization changes and corporate restructuring. Fund managers may need to trade in order to adjust their portfolios to properly track the index following such changes. Transaction costs are also incurred in this trading which can also increase tracking error. Depending on the relative size of the stocks entering and exiting the index (in terms of market capitalization), these changes may also require a number of costly odd-lot transactions in order to match the rebalanced index. The index manager also faces the additional challenge of executing orders at the best possible prices and in such a manner that minimizes the crystallization of capital gains tax liabilities to avoid significant erosion of returns. In the case of corporate restructuring, tracking error can also arise when index securities are involved in a merger or takeover by another company outside the index (Chiang, 1998). For example, a timing delay may exist between the date on which the index fund receives the cash settlement and the date when the target firm is removed from the index.

Periodical changes to the index can also make it difficult (and costly) for a passive fund to replicate the benchmark index.[4] Beneish and Whaley (1996) and Chiang (1998) identify that 'front-running' by market participants, who acquire index securities ahead of their inclusion in a benchmark, can have an undesirable impact on index funds.[5] Ultimately, changes in the composition of the index require passive funds to trade, which can result in transaction costs and tracking error. Overall, changes in the composition of the index are also expected to cause tracking error.

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[4] The ASX rules governing the inclusion and exclusion of securities from the All Ordinaries Index are made with regard to a stock's liquidity and market capitalization. Full replication funds may experience increased difficulties as a result of index changes, given that smaller capitalized securities have a higher probability of not meeting the All Ordinaries Index liquidity rules.

[5] For example, in the U.S. from October 1989, Standard and Poor's pre-announced changes to the S&P 500 Index, where the index change became effective five days after the announcement. This amendment was designed to provide index funds with greater ease in acquiring the new securities ahead

The magnitude of tracking error may differ across index managers depending on the portfolio management approach used to replicate returns on the index. The different approaches can be classified into 'full replication', 'stratified sampling' and 'optimization' strategies.[6] Full replication strategies require that index funds hold *all* securities in the basket index in the same proportion as represented in the index. Stratified sampling and optimized portfolios on the other hand are non-replication strategies designed to mimic the index through investment in a *subset* of index securities, while at the same time ensuring the portfolio has similar risk and return characteristics as the index.[7] Non-replication strategies aim to minimize transaction costs compared with full replication strategies. However, the trade-off is potentially higher tracking error arising from the performance of excluded securities which comprise the underlying index (Olma, 1998). Optimized portfolios are constructed using highly quantitative, multi-factor risk models aimed at minimizing tracking error through an understanding of the covariance between factors driving asset returns (Liu *et al.*, 1998; Olma, 1998). The expectation, *ceteris paribus*, is that tracking error will be systematically lower for full replication index funds compared with non-replication index funds.

The theoretical discussion above implies tracking error is likely to be related to cash flows and implicit transaction costs, index volatility, dividend distributions, changes in the composition of the benchmark index and the portfolio management strategy adopted by index managers. This article empirically documents the magnitude of tracking error experienced by index funds, as well as assessing the significance of these factors in explaining the magnitude of tracking error.

## DATA

This research analyses the tracking error of all Australian equity index fund managers with at least one index fund benchmarked to the All Ordinaries Accumulation Index over the period July 1989 to March 1999. The monthly Australian equity index fund returns were initially obtained from asset consultant William M. Mercer Pty Ltd and were subsequently checked against the returns supplied

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of their inclusion in the index. However, because index funds rebalance portfolios on the day the change becomes effective, this allows arbitrageurs the opportunity to sell the stock to index funds at a premium. The Australian Stock Exchange, in a similar manner to Standard and Poor's, preannounces changes to the All Ordinaries Index, however the length of time between the announcement of the change and the actual index amendment depends on the size of the stock.

[6] Olma (1998) suggests that the choice of portfolio management technique used to replicate the returns of an index is influenced by the liquidity of the constituent securities comprising that index.

[7] These characteristics include size, industry and dividend yield and other risk attributes such as those identified by BARRA.

directly by the investment managers.[8] Performance of the funds includes both income returns and capital gains.

The investment objective of the index funds examined involves replicating the performance of the All Ordinaries Accumulation Index. The investment managers also provided monthly cash-flow data, fund size data and information concerning the portfolio strategy adopted by the fund (i.e., full replication, stratified sampling and optimization). The Securities Industry Research Centre of Asia-Pacific (SIRCA) provided market bid–ask quote data for all stocks listed on the Australian Stock Exchange, as well as a database of stocks included and excluded from the All Ordinaries Index over the period evaluated.

There are seven pure index funds examined in this study. Of these, three use full replication portfolio management strategies and the remaining four passive funds use stratified sampling and/or optimization methods in order to mimic index returns. The combined assets of the index funds in this study are approximately $A5.0 billion as at 31 March 1999. The study is free of survivorship bias.[9]

## METHOD

The performance evaluation literature has predominantly evaluated the risk-adjusted performance of actively managed funds in assessing their ability to outperform market indices. The three classical performance evaluation techniques typically employed by prior studies have involved the Sharpe Ratio (1966), Jensen Measure (1968) and Treynor Index (1965). These approaches are consistent with attempting to determine whether active funds meet their investment objective, which is to *outperform* the benchmark.

Index fund strategies differ from actively managed funds in that passive funds aim to *replicate* the return and risk of the underlying benchmark index (Keim, 1999). If an index manager is unable to perfectly replicate the returns on a benchmark index (i.e., it experiences tracking error), then this is *prima facie* evidence that an index fund is not meeting its investment objective. Roll (1992) also argues that the level of tracking error in performance is an important criterion for assessing a fund manager's (both active and passive) performance. This is because the variability of a fund's differential returns provides a level of statistical confidence that the manager's investment process has been implemented successfully. For these reasons, this article investigates the ability of index funds to exactly mirror the performance of the underlying index to which they are benchmarked—their tracking error.

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[8] Other fund managers were also surveyed to ensure that the Mercer database included all managers offering passive equity funds. The Australian index fund market is particularly small compared with the universe of active equity managers that exist in Australia. In order to evaluate each manager's performance, we collected data for each manager's first Australian equity index fund. This ensures the longest sample period possible. While some managers have more than one index portfolio, the approach used in this article provides a representation of each index manager's ability to replicate the All Ordinaries Accumulation Index. Enhanced index funds and 'quant' funds were excluded from the analysis as they do not represent pure index strategies.

[9] The Mercer database covering wholesale funds includes both surviving and non-surviving funds. For the index fund category, no funds ceased to exist. Correspondence with the portfolio managers concerning their competitors and discussions with William M. Mercer Pty Ltd indicated that this study includes the population of Australian equity index fund managers over the period examined. The infancy of the passive funds market also helps to mitigate problems of survivorship. However, given the study uses only one fund for each manager, it may have selection bias.

*Measures of the Magnitude of Tracking Error*

Tracking error represents the extent to which the performance of a fund differs from the underlying benchmark index (Roll, 1992). Pope and Yadav (1994) identify a number of different ways tracking error may be measured. These are: (a) the average of the absolute difference in returns between the fund and index, (b) the standard deviation of return differences between the fund and index, and (c) the standard error of a regression of fund returns on benchmark returns. All of these measures are applied in this study.

Tracking error measured as the average absolute difference in returns ($TE_{1,p}$) is calculated as follows:

$$TE_{1,p} = \frac{\sum_{t=1}^{n} \left| e_{pt} \right|}{n} \tag{1}$$

where $e_{pt} = R_{pt} - R_{bt}$,

$R_{pt}$ = the return of index portfolio $p$ in period $t$,

$R_{bt}$ = the return of the benchmark index $b$ in period $t$, and

$n$ = the number of observations in the period.

This definition of tracking error provides a measure of the extent to which the returns on portfolio $p$ differ from the returns on the underlying benchmark index $b$ over the sample period. This definition treats any deviation in returns (outperformance or underperformance of the index portfolio) as tracking error.

Tracking error measured as the standard deviation of return differences between the fund and index is measured as follows:

$$TE_{2,p} = \sqrt{\frac{1}{n-1} \sum_{t=1}^{n} (e_{pt} - \bar{e}_p)^2} \tag{2}$$

It is important to note, however, if an index fund consistently underperforms the index by $x$ per cent per month, then the use of this method will result in zero tracking error over the period (Roll, 1992). The same problem occurs if an index fund consistently outperforms the index and would provide different conclusions concerning tracking error relative to ($TE_{1,p}$). The well-known market model can also be used to generate an estimate of tracking error ($TE_{3,p}$). If the returns on the index funds portfolio $p$ are regressed on the returns on the benchmark index $b$, as follows:

$$R_{pt} = \alpha_p + \beta_i R_{bt} + \varepsilon_{pt} \tag{3}$$

the standard error of the regression equation (the volatility of residuals ($\varepsilon_{pt}$) around the regression line) represents an estimate of tracking error. While this method should provide similar results to (1), Pope and Yadav (1994) note that if the beta of a portfolio is not exactly equal to one, then the regression residuals will differ from the tracking error metric $TE_{2,p}$. If the relationship between the two sets of returns is non-linear, then this approach will overstate tracking error.[10]

*Measures of Bias in Tracking Error*

The tracking error metrics above are concerned with the *efficiency* with which funds are able to track the All Ordinaries Accumulation Index. However, they do not indicate if there is a *bias* in performance. That is, they do not determine whether passive funds systematically underperform (or indeed outperform) the index. This article assesses whether there is any bias in the performance of passive funds using two measures. First, the variance or standard deviation is a traditional measure of the efficiency of an estimate, while the expected or mean value can be used to assess bias (Gujarati, 1995, p. 781). Analogously, in addition to examining the standard deviation of return differences ($TE_{2,p}$) to assess the efficiency of passive fund performance in tracking the index, the average difference in the return on the index fund and return on the index is examined to assess bias. Second, given that the objective of pure index funds is to mimic the performance of the All Ordinaries Accumulation Index, the coefficient $\alpha$ in the market model (equation 3) is expected to be zero and $\beta = 1$. Hence, the significance of the $\alpha$ coefficient is also examined for evidence of bias in tracking error.

*Determinants of Tracking Error*

The theory section identifies cash flows, transaction costs, index volatility, dividends, changes to the composition of the index and the index replication strategy employed by index equity funds (i.e., full replication and non-replication approach) as potential determinants of tracking error. To test the significance of these variables in explaining tracking error, the following model is estimated:

$$|e_{pt}| = \alpha_i + \beta_1 CF_{pt} + \beta_2 SPR_t + \beta_3 VOL_t + \beta_4 DIV_{pt} + \beta_5 INOUT_t + D_6 FR_{pt} + \varepsilon_{it} \quad (4)$$

where $|e_{pt}|$ is the absolute value of tracking error in period $t$ for fund $p$, $CF$ represents the absolute value of the funds net monthly cash flow scaled by the index fund's size (or normalised cash flow as per Gruber 1996), and $SPR$ is the market capitalisation-weighted and time-weighted average bid–ask spread across securities in the index in percent (see McInish and Wood, 1992). $VOL$ measures the volatility of the All Ordinaries Index and $DIV$ is the dividend yield of securities comprising the index.[11] $INOUT$ measures the percentage market capitalization of stocks included and excluded from the All Ordinaries Index each month.[12] $FR$ is a dummy variable taking on a value of 1 if an observation is drawn from a full replication fund, otherwise 0.

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[10] In addition to the market model, the parameters of the capital asset pricing model were also estimated. The parameters for the CAPM were virtually identical to those reported for the market model.

[11] DIV is measured as the difference in returns of the All Ordinaries Accumulation Index and All Ordinaries Price Index. Volatility was measured using the standard deviation of daily returns for the All Ordinaries Price Index each month. Alternative measures of volatility, including the Parkinson (1980) estimator (also outlined in Wiggins, 1991) were also evaluated: however, these methods also provided consistent findings.

## RESULTS

The tracking error and risk-adjusted performance of index equity managers evaluated in this study are reported in Table 1 together with a number of other descriptive statistics. Panel A of Table 1 reports the magnitude of tracking error for the entire sample period available for each fund.

Based on $TE_{1,p}$ the magnitude of monthly tracking error ranges from an average of 0.03 per cent to 0.242 per cent across funds. There is also evidence of considerable variability in tracking error for each fund through time. For example, tracking error for fund VI ranges between 0.001 per cent and 1.069 per cent across months. Given that differences in average tracking error are likely to be driven by time-specific factors, the tracking error metrics in Panel A are not strictly comparable across funds because of the differences in sample periods. Panel B reports tracking error metrics for the four funds with sixty months (five years) of continuous data to March 1999. The magnitude of monthly tracking error based on $TE_{1,p}$ still exhibits considerable variability across funds ranging from an average of 0.074 per cent for fund III to 0.223 per cent for fund VI. Monthly tracking error based on $TE_{2,p}$ is similar in magnitude, ranging from 0.097 per cent for fund III to 0.285 per cent for funds with sixty months of continuous data in Panel B. Finally, measures of tracking error based on $TE_{3,p}$ are almost identical to those based on $TE_{2,p}$.

While the magnitude of the tracking error documented in Table 1 is small, a number of observations can be drawn. First, Frino and Gallagher (2001) find that the tracking error for a sample of U.S. index funds averages between 0.039 and 0.110 per cent per month. The comparable figures for Australian Index funds documented in this article are substantially higher, ranging between 0.074 and 0.224. Hence, passive funds in Australia appear to have greater difficulty in achieving index returns. This reflects, in part, the higher cost of trading the underlying portfolio of stocks in Australia.[13] Second, a recent survey of Australian pooled index equity funds suggests that management fees range from approximately 0.005 per cent to 0.017 per cent per month (William M. Mercer, 1999). Hence, the tracking error documented in this study, which is an implicit cost of investing in index funds, is many times greater than the explicit cost charged by the fund manager to investors (i.e., the management fee). Third, the average magnitude of the monthly

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[12] The ASX amends the All Ordinaries Index at the close of trading each month. This could be inferred as the change occurring at $t$–1. However, the change affects the market in period $t$.

[13] For example, Aitken and Frino (1996) estimate that the average bid–ask spread of the largest 429 stocks listed on the ASX in the second half of 1992 averaged 4.4 per cent, while Jang and Venkatesh (1991) estimate that the average bid–ask spread of all stocks trading on the NYSE averaged 1.4 per cent in an earlier sample period.

TABLE 1

INDEX EQUITY FUNDS—TRACKING ERROR AND RISK ADJUSTED PERFORMANCE

| | | Absolute difference in returns | | | | | | | | Differences in returns | | | Market model parameters | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fund | Strategy | *N* | Mean ($TE1_p$) | *SD* | Min | Q1 | Q2 | Q3 | Max | Mean | *t*-stat | *SD* ($TE2_p$) | SE Reg. ($TE3_p$) | α | *t*-stat | β | $R^2$ |
| | | ($TE_{1,p}$) | | | | | | | | ($TE_{2,p}$) | | | ($TE_{3,p}$) | | | | |
| **Panel A: All index funds since inception to March 1999 (monthly data)** | | | | | | | | | | | | | | | | | |
| I | FR | 10 | 0.030 | 0.024 | 0.003 | 0.010 | 0.026 | 0.052 | 0.071 | −0.002 | −0.18 | 0.040 | 0.041 | −0.001 | −0.05 | 0.998 | 1.000 |
| II | FR | 117 | 0.120 | 0.113 | 0.000 | 0.046 | 0.104 | 0.163 | 0.781 | 0.006 | 0.36 | 0.165 | 0.167 | 0.006 | 0.37 | 1.000 | 0.998 |
| III | FR | 80 | 0.112 | 0.122 | 0.001 | 0.030 | 0.076 | 0.152 | 0.797 | −0.023 | −1.24 | 0.164 | 0.165 | −0.025 | −1.35 | 1.004 | 0.998 |
| IV | O,S | 36 | 0.122 | 0.122 | 0.000 | 0.036 | 0.086 | 0.173 | 0.556 | 0.036 | 1.27 | 0.170 | 0.172 | 0.034 | 1.16 | 1.003 | 0.998 |
| V | O,S | 60 | 0.103 | 0.094 | 0.003 | 0.039 | 0.085 | 0.135 | 0.480 | 0.017 | 0.96 | 0.139 | 0.137 | 0.014 | 0.79 | 1.006 | 0.999 |
| VI | O | 63 | 0.242 | 0.205 | 0.001 | 0.079 | 0.210 | 0.374 | 1.069 | 0.000 | −0.01 | 0.319 | 0.315 | 0.007 | 0.17 | 0.982 | 0.993 |
| VII | O | 21 | 0.104 | 0.111 | 0.001 | 0.042 | 0.071 | 0.157 | 0.466 | 0.018 | 0.53 | 0.153 | 0.157 | 0.019 | 0.55 | 0.997 | 0.999 |
| **Panel B: Five years to March 1999 (monthly data)** | | | | | | | | | | | | | | | | | |
| II | FR | 60 | 0.099 | 0.087 | 0.000 | 0.047 | 0.077 | 0.142 | 0.455 | −0.016 | −0.91 | 0.132 | 0.128 | −0.011 | −0.64 | 0.991 | 0.999 |
| III | FR | 60 | 0.074 | 0.063 | 0.001 | 0.028 | 0.065 | 0.103 | 0.267 | −0.012 | −0.96 | 0.097 | 0.095 | −0.009 | −0.73 | 0.994 | 0.999 |
| V | O,S | 60 | 0.103 | 0.094 | 0.003 | 0.039 | 0.085 | 0.134 | 0.480 | 0.017 | 0.96 | 0.139 | 0.137 | 0.014 | 0.79 | 1.006 | 0.999 |
| VI | O | 60 | 0.223 | 0.175 | 0.001 | 0.078 | 0.170 | 0.368 | 0.648 | 0.012 | 0.34 | 0.285 | 0.285 | 0.017 | 0.46 | 0.990 | 0.994 |

*Note*: Panels A and B document tracking error metrics for All Ordinaries Accumulation Index funds. Index funds are partitioned on the basis of portfolio strategy adopted in replicating the performance of the index where FR = full replication, S = stratified sampling and O = optimization. Panel A reports tracking error metrics from the inception of index funds to March 1999 using monthly data. Panel B documents tracking error for index funds with continuous five-year performance history to March 1999 using monthly data. All metrics are expressed in percentage terms. N represents the number of observations for each index fund used in the analysis.

movement in the All Ordinaries Accumulation Index over the five-year period examined in this study was 2.93 per cent. Hence, tracking error ranging between 0.074 and 0.223 ($TE_{1p}$) represents between 2.5 per cent and 7.6 per cent, respectively, of the average magnitude of the movement in the benchmark.

While there is evidence of significant tracking error in Table 1, there is no evidence of significant bias in performance. For example, the mean difference in returns documented in Table 1 is negligible, and not significant based on standard $t$-tests. Further, the estimated $\alpha$ coefficients are also negligible in magnitude and not significant for any of the funds or sample periods. This confirms that passive funds neither systematically outperformed or underperformed the All Ordinaries Accumulation Index over the sample period. In turn, this implies that investors with a long-term investment horizon will achieve investment returns that are similar to index returns. However, investors with shorter investment horizons (e.g., one month) are likely to experience significant under or overperformance relative to the index.

Table 2 reports the results of regression analysis testing the significance of the determinants of tracking error. All $t$-statistics are adjusted for heteroskedasticity and autocorrelation using procedures developed by Newey and West (1987). The $F$ statistic tests the joint significant of coefficients, and is significant at the 0.001 level. This confirms that the overall model is significant.

Consistent with expectations, the table documents the coefficients on CF, SPR and VOL are all positive and statistically significant. This confirms that tracking error is positively and significantly related to fund cash flows, the cost of trading

TABLE 2

DETERMINANTS OF TRACKING ERROR IN INDEX FUND PERFORMANCE

| Variable | Coefficient | $t$-stat |
|---|---|---|
| Intercept | 0.034 | 1.28 |
| *CF* | 0.005 | 1.76* |
| *SPR* | 0.147 | 2.14** |
| *VOL* | 0.034 | 1.68* |
| *DIV* | 0.028 | 0.77 |
| *INOUT* | 0.005 | 0.61 |
| *FR* | –0.045 | –2.94*** |
| $R^2$ adjusted | 0.089 | |
| $F$-statistic | 3.67*** | |
| Condition index | 6.316 | |

* significant at 0.10 level. ** significant at 0.05 level. *** significant at 0.01 level.
$t$-statistics have been adjusted for heteroskedasticity and autocorrelation using the Newey–West (1987) method.
The coefficients are expressed in percentage terms (i.e., $10^2$).

stocks in the index portfolio and the volatility of the benchmark. While the coefficients on *DIV* and *INOUT* are both positive, as expected, they are not statistically significant. Hence, dividend payments and the entry and exit of stocks in the index are not significantly related to tracking error. One explanation for the insignificance of dividend payments may lie in the use of dividend re-investment plans. Dividend re-investment plans (DRPs) allow investors to elect to receive stock to the value of the dividends paid in place of cash dividends. DRPs can be used by fund managers to eliminate the costs of re-investing the dividends in the index portfolio, as well as differences in the actual time between the day the dividend is paid and re-invested and that assumed in constructing the index. In Australia, index managers are likely to elect to use DRPs where possible to minimize tracking error in performance.

Apart from suggesting that index funds experience significant (but unbiased) and time-varying tracking error *per se*, the results above also have at least two other implications. First, in relation to the merits of an active versus passive investment strategy. The result that passive funds perform in line with the benchmark over a long-term period on a *before expenses* basis implies that they necessarily systematically underperform their benchmark on an *after expenses* basis. In contrast, previous research has found that although active funds do not outperform the benchmark index, they perform roughly in line with the benchmark on an *after expenses* basis. For example, Sawicki and Ong (2000) report an alpha for a sample of active Australian equity funds comparable with the index funds examined in this study. The alpha is close to zero and statistically insignificant.[14] Consistent with Gruber (1996), we interpret this as evidence that passive funds are not necessarily an unambiguous alternative to active funds. Second, the results also have implications for the appropriateness of an index as a technical benchmark for measuring the performance of active funds. The finding that passive fund performance is unbiased over the long term implies that the benchmark is achievable, and hence appropriate for use in performance assessment over a long sample period. However, the tracking error experienced by passive funds over short term periods (i.e., one month) casts doubt over the use of the technical benchmark in performance evaluation over short time intervals.[15] The results imply that underperformance/overperformance in any month may simply be a function of a fund manager's exposure to the factors that cause tracking error in the performance of passive funds, and cannot be attributed to the skill of a particular manager. Perhaps a more appropriate benchmark of performance over shorter periods is the performance of a comparable passive fund.

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[14] The most comparable result for active funds relative to the sample of passive funds examined in this study is the performance of NPST Australian Equities reported in Table 2 of Sawicki and Ong (2000). Lines 7 and 8 of Panel A in Table 2 report the results for active funds where performance estimates are based on before tax (and after expense) returns and a traditional Jensen model.

[15] Asset consultants regularly compare the performance of specific active funds on a monthly basis and draw conclusions regarding changes in their performance (e.g., performance surveys).

## CONCLUSION

This is the first Australian study to examine the ability of Australian equity index funds to mimic the underlying All Ordinaries Accumulation Index exactly, and the first study to provide evidence on the determinants of tracking error in passive fund performance. This study confirms that Australian equity index funds do indeed exhibit tracking error in their performance, and there is considerable variability in performance both across funds and through time. The magnitude of tracking error is significantly related to fund cash flows, the cost of trading stocks in the index portfolio, the volatility of the benchmark and the investment strategy used by the fund manager. This tracking error reflects the difficulties facing index equity managers in approximating the performance of a frictionless index and represents an additional risk to investors in passive funds.

While this article provides evidence of tracking error in index fund performance, there is little evidence of a bias in fund performance over the sample period. This implies that investors who engage the services of index managers with long investment horizons ultimately achieve returns that are commensurate with those of the All Ordinaries Accumulation Index before expenses.

The results reported here also have implications for the debate on whether passive funds represent a better investment than active funds, and the appropriateness of an index as a benchmark in performance evaluation. First, a comparison of results to previous research on active funds suggests, after taking into account costs, that passive funds are not necessarily a superior alternative to active funds. Second, the results also imply that while the All Ordinaries Accumulation Index is suitable for estimating performance over a long sample period, the degree of tracking error experienced by passive funds on a monthly basis casts doubt on the appropriateness of using an index as a benchmark for assessing performance over short-term periods.

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# On the Relevance and Comparability of Segmental Data

The recent adoption in the U.S.A. and Canada of the management approach to identify reportable segments places relevance of the disclosed segmental data as the overriding concern over comparability. This study investigates whether relevance and comparability are mutually exclusive or can be simultaneously achieved in segmental disclosure. It is explicitly recognized that both properties are a joint function of segment performance and segment identification, the performance–identification conundrum. By using a data set drawn from the U.K., a jurisdiction that explicitly allows directors' discretion when identifying reportable segments, and a series of tests which remove performance differences, the potential impact of segment identification on the relevance/comparability issue is highlighted. The results of the tests reveal that for a significant portion of the sample the levels of both relevance and comparability are simultaneously low due to the segment identification choices made. These choices appear to match the possible outcomes of following the management approach to identification. By implication, the adoption of the management approach may lead to reduced comparability and relevance in some cases.

**Key words:** Comparability; Financial reporting; Relevance; Segmented information.

## INTRODUCTION

Segment reports have always been promoted as a means to understand more fully the operations and results of the total enterprise in order that a better assessment of future prospects may be made (Accounting Standards Committee [ASC], 1990; Financial Accounting Standards Board [FASB], 1976; International Accounting Standards Committee [IASC], 1981). To achieve this goal, segmental data must be both relevant and comparable (FASB, 1980). In the early pronouncements on segment disclosure (FASB, 1976; IASC, 1981; ASC, 1990), the identification of reportable segments was based upon risk–return differences. Whilst not required to be generated using GAAP, the data disclosed had to be of a common type (e.g., segment sales, assets and profit) and reconciled with the GAAP consolidated total (Accounting Standards Committee, 1990, para. 37; FASB, 1976, para. 30).

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Although no single definition of risk return differences was provided by any of the standard setters, all provided guidelines which suggested a disaggregation based on industry groupings (e.g., SIC codes), and thus a focus on comparability with industry norms. Indeed, the FASB uses the term *industry approach* (FASB, 1997, para. 57) to describe the FAS 14 procedure.

Following twenty years of identifying reportable segments by means of risk–return differences, concerns over the relevance of data disaggregated using this approach (FASB, 1997, para. 45) resulted in the recent changes introduced in the U.S. and Canada which place an overriding concern on relevance over comparability (FASB, 1997, para. 65; Canadian Institute of Chartered Accountants [CICA], 1997, s. 1701). Under the new regulations, segments are required to be identified via the management approach, based on an enterprise's internal organization structure and, additionally, 'focuses on financial information that an enterprise's decision makers use to make decisions about the enterprise's operating matters (FASB, 1997, para. 5). A recent article examining GE's segment results indicates the difficulty in interpreting this (Kahn, 2001).

Although contradictory to Statement of SFAC 2 (FASB, 1980, para. 33) which identifies relevance and comparability as two qualities of accounting data that 'interact . . . to contribute to the usefulness of information', the new North American standards imply that the disclosure of relevant *and* comparable segmental data is unattainable. In this study we investigate whether segmental data can simultaneously offer relevance and comparability and, further, whether real company/segment performance or methods of segment identification or both drive any incompatibility between the two qualities. The long established performance–identification conundrum (Emmanuel and Gray, 1977; Emmanuel and Garrod, 1987, Hussein and Skerratt, 1992) basically implies that performance data are only as useful as the extent to which reportable segments are appropriately identified.

Unlike their North American counterparts, the IASC regulators retained the risk–return basis for identification of separate lines of business or geographical areas in its exposure draft on segment reporting (IASC, 1995). This approach emphasizes a need for comparability with industrial and geographic norms over relevance. The potential gulf between the management and industry approaches was closed by the IASC's secretary-general, Sir Bryan Carsberg, stating that: 'We had always assumed that the risks and rewards approach would virtually match the reporting of segments by company organization charts because businesses usually report in product groups or geographic areas which have similar risk characteristics' (Schweikart *et al.*, 1996). This is repeated in the revised IASC standard, IAS 14: 'An enterprise's internal organizational and management structure and its system of internal financial reporting to the board of directors and the chief executive should normally be the basis for identifying the predominant sources and nature of risks and differing rates of return facing the enterprise' (IASC, 1997, para. 27).

The problem which standard setters and regulators throughout the world have faced is that there is no universally acceptable prescriptive means of identifying reportable segments. Each large, diversified, multinational enterprise to which the standards apply will exhibit its own particular strategy, structure and internal reporting conventions. In emphasizing data relevance over comparability, the FASB has concluded that the relevance inherent in a company's own management structure will provide more useful information for users than the industrial comparability offered by the risk–return approach.

Ijiri (1995) is sceptical. He distinguishes 'capital' (external) and 'resource' (internal) managers and identifies their different information needs. The former are responsible for raising and allocating capital to earn a maximum total return. The latter are required to operate projects efficiently to maximize the projects' returns. Capital managers are outside investors and managers of investment portfolios whilst resource managers are general managers of divisions or subsidiaries. Ijiri argues that each type of manager requires different information because of the different perspectives adopted. Internal managers are said to be more concerned with relevance and their own particular operating environment whilst external managers are more concerned with comparability as investment fund managers seek high, risk adjusted returns. Thus, Ijiri argues that an overriding concern with relevance may disadvantage the external users.

The contingent nature of internal structures is illustrated by different parts of the enterprise adopting different strategies, control systems and having different data requirements (Bartlett and Ghoshal, 1993; Gupta and Govindarajan, 1991). Hence, large, multi-activity enterprises do not necessarily adopt a single, uniform method of internal reporting. The dynamics of conducting business in multiple industries in the global market require internal accounting systems to be tailored to many factors, including industry norms, local culture and business practice. On the other hand the fungibility of investment funds across industrial and national borders drives the need for a degree of standardization and uniformity in financial reporting to enable international stock markets to operate effectively. The tension is obvious and the relationship between the segment and consolidated reports offers a potential test site to determine whether relevance and comparability may or may not be achieved.

In a wide-ranging study Pacter (1994) recognizes that the introduction of the management approach to identify reportable segments implies a willingness to accept less comparability for greater relevance. Hermann and Thomas (1997) indicate that one of the effects of the new North American regulations is that internally reported segments may no longer be comparable across firms. Empirical support for these views is provided in a U.K. study where Edwards (1995) reports that preparers identified segments by the pre-existing organizational and geographic groupings, presumably since disclosed segmental data are of greater use to company management than to shareholders.

As recognized by the FASB (1980) and the ASB (1995), the qualitative characteristics of accounting data, including relevance and comparability, are themselves generated by a number of contributory factors such as, amongst others, representative faithfulness, predictive value and completeness. All of these characteristics contribute to the overall usefulness of accounting information. Clearly the method used by companies to identify reportable segments will contribute to the achievability of these desired characteristics.

U.K. companies are currently recommended to disclose, and thereby identify, segmental data on the basis of a risk–return approach. However, SSAP 25 (ASC, 1990) provides no deterministic rules for the identification of reportable segments. Rather, a list of characteristics is offered for consideration in identifying segments of different risk–return profiles. In addition, the standard explicitly recognizes the need for directors' (managers') discretion (ASC, 1990, para. 7) and this discretion extends, ultimately, to non-disclosure of segment data if, in the opinion of the directors (managers), this is seriously prejudicial to the wellbeing of the enterprise (ASC, 1990, para. 43). The explicit recognition of director discretion and the provision of several characteristics that may determine a risk–return profile allow virtually any identification criteria to be admissible under U.K. regulations (Emmanuel and Garrod, 1992; Emmanuel *et al.*, 1999).

The relevance and comparability of disclosed segmental data (i.e., of the numbers disclosed) are a function of both segment performance and the method by which the segments are identified. Using a data set drawn from the U.K., which explicitly allows directors' discretion in identifying reportable segments, enables both aspects of the relevance/comparability question to be captured. Further, a series of tests is designed which identifies the more common explanations of performance differences. These tests are designed to identify any residual differences that we hypothesize are a function of the segment identification process.

## RELEVANCE AND COMPARABILITY IN THE CONTEXT OF SEGMENT DISCLOSURE

The concepts of relevance and comparability are central to the qualitative characteristics of accounting data in both the U.S. and the U.K. The FASB, for example, defines relevance as: 'The capacity of information to make a difference in a decision by helping users to form predictions about the outcomes of past, present and future events or to confirm or correct prior expectations' (FASB, 1980). The ASB (1995) declares that: 'Information has the quality of relevance when it has the ability to influence the decisions of users by helping them evaluate past, present or future events or confirming, or correcting, their past evaluations.'

The relevant extracts regarding comparability are: 'The quality of information that enables users to identify similarities in and differences between two sets of economic phenomena' (FASB, 1980); 'Users must be able to compare the financial statements of an enterprise over time to identify trends in its financial position and performance. Users must also be able to compare the financial statements of different enterprises to evaluate their relative financial position, performance and financial adaptability' (ASB, 1995).

Two aspects are striking when comparing the U.S. and U.K. definitions: their similarity and their lack of specificity. The latter characteristic is hardly surprising as the definitions come from general documents that set out the generic characteristics of accounting information. However, it is equally clear that relevance entails the ability of financial data to clarify outstanding and unresolved questions in a user's mind whilst comparability implies that economic performance can be compared between reporting organizations.

To define relevance and comparability in more detail with regard to segmental data we need to further consider the purposes of this kind of disclosure. In the current U.K. standard, SSAP 25, the defined purpose of segmental data is:

> to provide information to assist the users of financial statements:
> a) to appreciate more thoroughly the results and financial position of the entity by permitting a better understanding of the entity's past performance and thus a better assessment of its future prospects; and
> b) to be aware of the impact that changes in significant components of a business may have on *the business as a whole.* (emphasis added; para. 1)

Similar aspirations are identified in FAS 131, where the objectives of segment disclosure are:

> to help users of financial statements to
> a. better understand the enterprise's performance
> b. better assess its prospects for future net cash flows
> c. make more informed judgements about the *enterprise as a whole.* (emphasis added; para. 3)

The performance of the enterprise as a whole is argued to be summarized in the consolidated accounts.[1] Thus, the two extracts quoted above indicate that information on segments of the company in isolation is not useful. Segment data only take on relevance when they are combined to generate a picture of the composite whole. Relevance, in the context of segmental reporting, can be inferred to mean that the user knows and understands more about total company performance after reading the segmental data than after reading the consolidated results alone. Arguably, if the segment results provide a completely different picture of company performance than that indicated by the consolidated figures, users will be confused rather than informed.

As disaggregated data offer insights to the 'several classes of business or... several geographical areas, with different rates of profitability, different opportunities for growth and different degrees of risk' (ASC, 1990, para. 1) which comprise the enterprise, comparison with other segments in the same company or in the same industry becomes feasible. Within-company comparison indicates the relative importance of segments whilst external comparison with independent companies in the same industry sector offers relative performance measures. Virtually all segment regulations caution against external comparison (e.g., ASC, 1990, para. 2) of individual segments between companies. However, there is empirical evidence that comparisons with industry norms are widespread. Emmanuel and Garrod (1987) report that users, as represented by financial analysts, favour segments identified and reported consistently in respect to industry sectors or sub-sectors. Hussein and Skerratt (1992) reinforce the needs of the managers of capital and

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[1] Although this claim is not incontestable, see, for example, Chambers (1968), Clarke and Dean (1993).

advocate line of business segments being reported which match analysts' special expertise of forecasting profitability for specific industry sectors. These research results and the previous insistence of the FASB to designate the risk–return approach as the industry approach (FASB, 1997, para. 57), all point to comparability, within the scope of segment disclosure, meaning comparability with industry norms.

Naturally, the purpose of comparability is to differentiate those firms that are outperforming their competitors from those that are underperforming. This means that differences from industry norms are to be expected, indeed are required in order to learn more about company performance. However, fluctuations away from industry norms must be within statistical limits to be understandable. If a company is operating outside the normal range of the distribution of performance of its competitors then interpretation becomes difficult. Whilst fluctuations from the norm are to be expected, significant deviations are likely to reflect structural differences not explained by performance alone that prevent meaningful comparisons to be made.

Thus, for relevance to be attained in the context of segmental disclosure, the segmental data should explain or confirm the consolidated results. For comparability to exist, the segmental figures must provide data that are comparable within the context of relevant industry norms. These operationalized definitions of relevance and comparability are used to investigate the extent to which U.K. company segmental disclosure reflects relevance and/or comparability.

## RESEARCH METHOD

Given these definitions of relevance and comparability for segmental data, it is possible to characterize the process of information acquisition from the segmental report as a sequential decision tree. This is achieved by using concepts of performance measures, industry benchmarks and relative performance that are all detailed more fully below. However, it is helpful, at this initial stage, to describe our approach in more general and intuitive terms.

Summing individual segmental data allows an alternative measure of company wide performance to be attained. This total segment performance measure may be more or less in line with the company industry norm than that revealed by the consolidated disclosure. If the segmental performance measure is closer to the industry norm then there is prima facie evidence of relevance in the segment report. The segmental performance figures might indicate that the more unusual consolidated performance measure is driven by such factors as extraordinary company wide factors, financing decisions and costs or taxation, which are usually excluded from the segmental disclosure. Thus, the reader has learned more about the nature of the company wide operations by having access to the segmental disclosure.

It is the consolidated figures, which include the common or non-allocated costs, that reflect company performance. However, the segmental disclosure highlights that the underlying operations of the company are indeed in line with industry norms and that other factors are influencing total reported performance. In this way the reader is further enlightened about the reported consolidated results and thus the disclosure is relevant. If, alternatively, the sum of the reported segmental disclosure is more out of line with industry norms than the consolidated figures then it is unclear whether such performance is driven by operations or other factors. No additional clarity is brought to the interpretation of the consolidated results and relevance is lacking.

However, the segmental report not only provides an alternative indicator of total company performance but also provides details of the performance of individual segments of the company. Thus, an additional source of information arises from a comparison of individual segment performances with their own specific industry norms. Once again, these segmental performance measures may be more or less similar with industry norms. If they are similar, then there is prima facie evidence of comparability in the segmental data. Thus four combinations of (non) relevance and (non) comparability are achieved as depicted in Figure 1.

Of course, at this stage the assessment of relevance and comparability is very limited, hence the use of the term 'prima facie' in Figure 1. The segment report provides not only data on individual segment performance but also the nature of the segments operated by the company. The reported data reflect both actual performance and reporting decisions, the performance–identification conundrum. Tests are developed that identify operational reasons why actual performance might be out of line with the consolidated figures and/or industry norms. Specifically: (a) the dominance of any single segment; (b) the extent of diversification amongst the reported segments; and (c) the extent to which GAAP accounting procedures are adopted.

By specifically measuring these effects it can be established whether patterns emerge between the four relevance/comparability groupings. In addition, any remaining performance differences are hypothezised to follow from the discretion available to managers in identifying reportable segments. To achieve this a number of proxy definitions need to be developed.

### *Performance Measures*

The disclosure requirements of SSAP 25 enable three performance ratios to be generated for individual reported segments: profit margin (profit/turnover); asset turnover (turnover/net assets); and return on assets (profit/net assets). However, SSAP 25 specifically spotlights return on assets in differentiating reportable segments and so our analysis focuses on this ratio alone.[2]

Comparing consolidated return on assets with segmental equivalents requires caution due to the manner in which the segment data are reported. The segment result normally excludes interest, taxation and minority interests, and the segment net assets normally do not include a deduction for long-term debt financing. Whilst the purpose of this work is not to compare directly consolidated and segment

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[2] Analyses using the other two ratios were also carried out but the results are qualitatively similar to those reported below and so are not reported here. They are available upon request from the authors.

FIGURE 1

A DECISION TREE CHARACTERIZATION OF RELEVANCE AND COMPARABILITY IN SEGMENTAL DATA

| Test for prima facie evidence of relevance | | Test for prima facie evidence of comparability | | Segment data |
|---|---|---|---|---|
| | | | yes | Prima facie evidence of both relevance and comparability ($RC$) |
| | | Are the individual segment performances in line with their own specific industry norms? | | |
| | yes | | no | Prima facie evidence of relevance but non comparability ($R$) |
| Is the total segment $RoA$ closer to the company industry norm than the consolidated $RoA$? | | | | |
| | no | | yes | Prima facie evidence of comparability but non relevance ($C$) |
| | | Are the individual segment performances in line with their own specific industry norms? | | |
| | | | no | Lack of prima facie evidence of either relevance or comparability ($N$) |

ratios, it is felt that transparency of the results is improved if the bases on which the two sets of ratios are calculated are as similar as possible. The ratio definitions used are set out below and are consistent with those advocated (although not mandated) in SSAP 25:

$$\text{Segment return on assets} = RoA_s = \frac{\text{segment result}^3}{\text{segment net assets}}$$

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[3] 'Result' is the term used in SSAP 25. For all practical purposes the term 'profit' can be substituted for the term 'result'.

$$\text{Consolidated return on assets} = RoA_c$$

$$= \frac{\text{profit before interest and tax}}{\text{(consolidated total assets—current liabilities)}}$$

$$\text{Total segment return on assets} = RoA_{ts} = \frac{\text{Sum of segment result}}{\text{Sum of segment net assets}}$$

*Industry Benchmarks*
Two sources are used to generate industry benchmarks: FT Extel Company Analysis and Lotus One Source. The former is a database of all publicly listed U.K. companies (*c.* 4,000 firms) whilst the latter is a database of all U.K. companies, listed and non-listed (*c.* 100,000 firms). The two sets of industry norms (Extel and Lotus One Source) are generated from the two databases by calculating an equally weighted mean and standard deviation for the *RoA* (defined in exactly the same way as for $RoA_c$ to maintain consistency) of each industry grouping. The companies included in these calculations are all the companies in the particular database that had available data, excluding those with outlier values. For each industry category, outliers are defined as the top and bottom 1 per cent of observations. If the number of companies in the industry segment is less than a hundred then the highest and lowest values are excluded in calculating the industry norm.

*Company and Segment Industry Classification*
Each database has slightly different industry groupings (see Appendix) but within both databases each company is identified (including our sample companies) as operating in one of the databases' industry groupings based on the predominant activity of the company. Using the full annual report of the sample companies, the researchers identified the most suitable industry category, from both the Extel or Lotus One Source lists, for each reported line of business segment. This was carried out independently by the researchers to ensure as little bias in the classification as possible. Therefore each sample company has an assigned consolidated industry categorization taken directly from each database, and each segment within each sample company has an allotted industry categorization selected from the industry categorizations used by each database.

In addition, as the industry classifications from Extel and Lotus One Source are slightly different, the researchers placed themselves in the position of financial analysts and selected what they thought to be the most suitable industry classification for each disclosed segment from either the Extel or Lotus One Source list of industry classifications. This produced a hybrid set of industry benchmarks for each company's disclosed segments. For each of the two (Extel and Lotus One Source) consolidated classifications there are two (Extel or Lotus, and hybrid) segment classifications. This results in four sample industry classifications for each sample company: Extel consolidated, Extel segmental; Extel consolidated, hybrid segmental; One Source consolidated, One Source segmental; and One Source consolidated, hybrid segmental.

### *Relative Performance*

Individual company $RoA_s$, and the $RoA_s$ generated by totalling segment profits and dividing by total segment net assets, are standardized by the appropriate industry benchmarks and this procedure is repeated using the segment *RoA* and the particular segment industry benchmark. The standardized *RoA* is generated by subtracting the industry benchmark *RoA* from the segmental, consolidated or total segment *RoA* and dividing the result by the industry benchmark standard deviation. Formally:

$$\text{Standardized segmental performance } (ssp_{ij}) = \frac{RoA_{ijs} - RoA_{ijb}}{\sigma_{ijb}},$$

$$\text{Standardized consolidated performance } (scp_j) = \frac{RoA_{jc} - RoA_{jb}}{\sigma_{jb}},$$

$$\text{Standardized total segmental performance } (stsp_j) = \frac{RoA_{tsj} - RoA_{jb}}{\sigma_{jb}}.$$

where $RoA_{ijs}$ is the return on assets of segment $i$ of company $j$,
$RoA_{ijb}$ is the return on assets of the benchmark industry of segment $i$ of company $j$,
$RoA_{tsj}$ is the return on assets for company $j$ using the sum of segment results divided by the sum of segment net assets,
$\sigma_{ijb}$ is the standard deviation of the return on assets for all companies in the database for the benchmark industry of segment $i$ of company $j$,
$RoA_{jc}$ is the return on assets of company $j$,
$RoA_{jb}$ is the return on assets of the benchmark industry of company $j$, and
$\sigma_{jb}$ is the standard deviation of the return on assets for all companies in the database for the benchmark industry of company $j$.

The absolute values of these measures ($assp_{ij}$, $ascp_j$ and $astsp_j$) enable the number of standard deviations the individual segment (consolidated, total segment) performance is away from its appropriate industry benchmark to be determined. Formally:

$$assp_{ij} = |ssp_{ij}|$$

$$ascp_j = |scp_j|$$

$$astsp_j = |stsp_j|$$

Early evidence from the U.S. (Deakin, 1976) and more recent from the U.K. (Bougen and Drury, 1980; McLeay, 1986, 1987; Tippett, 1990) indicates that ratio values cluster around the mean. In addition, Lev (1969) provides evidence that firms recognize the process of benchmarking carried out by analysts and tend to adjust their financial ratios to conform as closely as possible to industry averages. We have no priors that would lead us to believe that this is any different at the segmental level from that identified at the consolidated level. As a relative measure, our standardized performance measure abstracts from any such influences.

The standardization process results in a performance measure for the consolidated results ($ascp_j$), a company wide performance measure based on the total segment report ($astsp_j$) and a separate performance measure for each individual segment ($assp_{ij}$). To gain a single measure of a company's segmental performance, the absolute values of a company's segmental performances are summed and divided by the number of reported segments. This provides an 'average' value of how similar the company's segments reported results are to their respective industry benchmark ($massp_j$).

$$massp_j = \frac{1}{n_j}\sum_{i=1}^{n_j} assp_{ij} = \frac{1}{n_j}\sum_{i=1}^{n_j}\left|ssp_{ij}\right|$$

where $n_j$ is the number of reported segments in company $j$, and all other variables are as previously defined.

By subtracting the absolute standardized total segmental performance measure ($astsp_j$) from the absolute standardized consolidated performance measure ($ascp_j$) we obtain our prima facie measure of relevance:

$$REL_j = ascp_j - astsp_j$$

If the relevance measure is positive then this indicates that the total segmental performance is more in line with the company industry norm than the consolidated data.

Comparability is measured by the mean absolute standardized segmental performance ($massp_j$) as defined above. A low value of this statistic indicates that all segments are performing close to their industry norms whilst a high value indicates that few or none of the company's segments are performing close to their industry norms. It is worth reiterating that high values of $massp_j$ can reflect either under or over performance of the segment as the statistic is in absolute terms. The sample companies are split depending upon whether they lie above or below the median value (0.44572) of the *massp* statistic for the whole sample.

### *Explanatory Variables*

To gauge the incidence of a dominant segment and the coincidence of the consolidated industry classification with that of the largest reported segment, two simple dummy variables are used. A segment is defined as dominant if it contributes more than 50 per cent of total segment sales *and* if the next largest segment contributes at least 20 per cent less to total segment sales (i.e., less than 35 per cent of total sales if the largest segment contributes 55 per cent to total sales). The dummy variable takes on a value of 1 if a dominant industry is identified, 0 otherwise. The coincidence of the consolidated industry classification with that of the largest reported segment, which need not be dominant, is identified with a dummy variable value of 1 if they are coincident, and 0 otherwise.

To identify whether a portfolio effect is operating within a company we compare the mean (averaged across all of a company's reported segments) absolute standardized segmental performance measure ($massp_j$) with the absolute value of the mean (averaged across all of a company's reported segments) standardized segmental performance. Formally we can define our measure of any portfolio effect as:

$$\text{Portfolio measure for company } j\ (PM_j) = massp_j - \left| \frac{1}{n_j} \sum_{i=1}^{n_j} ssp_{ij} \right|$$

$$= \frac{1}{n_j} \sum_{i=1}^{n_j} \left| \frac{RoA_{ijs} - RoA_{ijb}}{\sigma_{ijb}} \right| - \left| \frac{1}{n_j} \sum_{i=1}^{n_j} \frac{RoA_{ijs} - RoA_{ijb}}{\sigma_{ijb}} \right|$$

where $n_j$ = number of reported segments for company $j$,
$RoA_{ijs}$ = the return on assets of segment $i$ of company $j$,
$RoA_{ijb}$ = the return on assets of the benchmark industry for segment $i$ of company $j$,
$\sigma_{ijb}$ = the standard deviation of the *ROA*s of the benchmark industry for segment $i$ of company $j$, and
all other variables as previously defined.

If a portfolio effect is operating then some segments will be outperforming their industry benchmark and some others underperforming. In the consolidated total these over and under performances will be diversified away to some extent. If, on the other hand, *all* reported segments under or outperform the industry benchmark, there is no potential for diversification to operate. If diversification is occurring then the *PM* value will be large, with a maximum value of $massp_j$ if all differences are diversified away. If no diversification occurs, the *PM* value will be low. In fact it will be zero if *all* segmental performances are either over *or* under performances compared to their industry benchmarks.

Finally, to evaluate whether the financial segmental data disclosed is generated by internal reporting conventions that do not follow GAAP, use is made of the percentage of unallocated consolidated assets as a proxy. There is growing evidence that enterprises of the size of companies that routinely report segment data use quite different management control systems (Holzer and Schoenfeld, 1986; Coates *et al.*, 1993; Sheridan, 1995). This idiosyncratic approach (Merchant, 1989; Simons, 1995) suggests that not every segment of the enterprise uses identical performance measurement, allocation, transfer pricing or managerial incentive schemes and reflects the different strategies adopted by different segments or strategic business units (Govindarajan, 1988; Gupta and Govindarajan, 1991). Under these circumstances it is likely that a complete allocation of consolidated assets is unlikely and that group accounts will be established to absorb the slack. Thus our internal accounting metric is calculated as:

$$IAM_j = \frac{\text{Consolidated } \textit{net} \text{ total assets}_j - \sum_{i=1}^{n_j} \text{Segmental net assets}_i}{\text{Consolidated } \textit{net} \text{ total assets}_j}$$

Evidence of high levels of unallocated assets is taken to indicate the provision of financial information found useful by internal decision makers. This would suggest the use of the management approach for segment identification.

### *The Sample*

The sample consists of seventy-four U.K. publicly listed companies, which collectively report 382 line of business segments, and the data are drawn from their 1995 accounts. Initially a random sample of one hundred companies within the Times top 250 in 1995, excluding banks and insurance companies, was selected. The sample is taken from this group of companies consistent with the findings of Skerratt and Tonkin (1992) that larger companies exhibit a greater level of segmental disclosure and compliance than smaller companies. It proved impossible to obtain hard copy annual reports for four of the companies, reducing the sample to ninety-six. Even though all these sample companies meet the size criteria (S248 Companies Act, 1985) to disclose segment reports, a further twelve companies do not disclose line of business segment data. In two cases the directors claim that such disclosure would be seriously prejudicial to the company (para. 55(5), Sch. 4, Companies Act, 1985) whilst a further six claim that the company's operations are all in a single industry. The remaining four companies are silent on why there is no disclosure. In addition, a further ten companies do not provide full mandated disclosure by omitting segmental net asset information. This leaves a final effective sample of seventy-four companies.

## RESULTS

The initial analysis classifies sample companies into one of the four groups identified in Figure 1. The procedure of classifying the segment report as relevant and/or comparable results in companies occupying all four groups of the decision tree (see Table 1). It is encouraging that two-thirds of the sample display prima facie evidence of relevance ((26 + 23)/74) and half display prima facie evidence of comparability ((26 + 11)/74). However, a disturbingly high percentage of nearly 20 per cent (14/74) of the sample display prima facie evidence of neither relevance nor comparability. Denoting the 'relevance and comparability' group as RC, the 'relevant but not comparable' as R, the 'comparable but not relevant' as C and the 'neither relevant nor comparable' as N we can compare the characteristics of the four groups on the dimensions reported in Table 1.

It is worth repeating at this point that the categorization procedure is based on observations above and below the median values of relevance and comparability for the sample companies. Thus the group titles should not be taken literally but rather as comparative shorthand. For example, the 'neither relevant nor comparable' group might be more factually described as 'having the lowest levels of relevance and comparability from the sample companies'. If relevance and comparability are indeed competing characteristics in segmental data, as intimated by the FASB (1997), then we would expect to see the majority of companies in cells R and C. As it is, the sample companies are fairly evenly spread across the four

### Table 1

### MEAN VALUES OF CHARACTERISTIC STATISTICS OF THE TOTAL SAMPLE AND THE FOUR GROUPS

| Group | Number | Mean $scp_j$ | Mean $REL_j$ | Mean $ssp_j$ | Mean $assp_j$ | Dominant segment—coincidence of largest segment and company industry classification | | | | Portfolio effect | % unallocated |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1–1 | 1–0 | 0–1 | 0–0 | | |
| Total | 74 | −0.0363<br>(1.1814) | 0.4003<br>(0.7166) | 0.0562<br>(1.8846) | 0.8274<br>(1.5345) | 0.2566<br>(19) | 0.2973<br>(22) | 0.1757<br>(13) | 0.2703<br>(20) | 0.2994<br>(0.1096) | 0.2714<br>(0.0372) |
| Relevant and comparable (RC) | 26 | −0.3846<br>(0.9764)<br>RC<R**<br>RC<C** | 0.5890<br>(0.4941)<br>RC<R*<br>RC>C***<br>RC>N*** | 0.0145<br>(0.0575) | 0.3098<br>(0.0066)<br>RC<R***<br>RC<N*** | 0.3077<br>(8) | 0.2308<br>(6) | 0.0769<br>(2) | 0.3846<br>(10) | 0.3952<br>(0.1256)<br>RC>N*** | 0.2357<br>(0.0522)<br>RC>N* |
| Relevant but not comparable (R) | 23 | 0.3684<br>(2.3682)<br>R>RC**<br>R>N* | 0.9386<br>(0.8359)<br>R>RC*<br>R>C***<br>R>N*** | 0.2164<br>(5.7525) | 1.6956<br>(3.7809)<br>R>RC***<br>R>C***<br>R>N** | 0.2174<br>(5) | 0.4348<br>(10) | 0.1304<br>(3) | 0.2174<br>(5) | 0.2873<br>(0.0923)<br>R>N** | 0.2939<br>(0.0206)<br>R>C** |
| Not relevant but comparable (C) | 11 | 0.0318<br>(0.0130)<br>C>RC** | −0.2865<br>(0.0769)<br>C<RC***<br>C<R*** | −0.0416<br>(0.0507) | 0.2800<br>(0.0053)<br>C<R***<br>C<N*** | 0.2727<br>(3) | 0.0909<br>(1) | 0.3636<br>(4) | 0.2727<br>(3) | 0.3590<br>(0.1677)<br>C>N*** | 0.2139<br>(0.0066)<br>C<R**<br>C<N** |
| Neither relevant nor comparable (N) | 14 | −0.1075<br>(0.1965) | −0.2947<br>(0.0968)<br>N<RC***<br>N<R*** | −0.0528<br>(0.6286) | 0.7922<br>(0.0774)<br>N>RC***<br>N<R**<br>N>C*** | 0.2143<br>(3) | 0.3571<br>(5) | 0.2857<br>(4) | 0.1249<br>(2) | 0.0946<br>(0.0219)<br>N<RC***<br>N<R**<br>N<C*** | 0.3463<br>(0.0561)<br>N>RC*<br>N>C** |

* Significant at 10% level of significance, one tail. ** Significant at 5% level of significance, one tail. *** Significant at 1% level of significance, one tail.
*Note*: Variances are in parentheses except for the four columns showing dominant segment, where they represent the number of firms in each cell. Significant differences noted for each cell.

groups, indicating that other factors impinge upon the relative levels of comparability and relevance. The use of the four 'shorthand' group titles therefore seems appropriate as indicative of those relative levels.

The RC group is characterized by firms that are generally underachieving according to their consolidated results (mean $scp_j$). Their consolidated performance is significantly worse than the R and C groups of companies. However, their individual segments are not performing significantly differently from the average of the sample or the other groups (mean $ssp_j$). Whilst the frequencies in the dominant segment/company industry coincidental with the largest reported segment might suggest differences, none are statistically significant across any of the groups. The portfolio effect is greater than for any other group, statistically so for the N group at the 1 per cent level of significance, whilst its percentage of unallocated assets is statistically lower than for group N at the 10 per cent level of significance. These characteristics indicate that the companies in this group are widely diversified and report segment results largely in line with their industry norms. The low percentage of unallocated assets indicates that GAAP procedures are adopted in generating the segmental data and that the industry approach to segment identification appears to be used. For these companies, the segment report is extremely informative as it reveals the portfolio nature of the results that a comparison of consolidated and company industry performance would be incapable of explaining. Due to the multiple nature of these companies' operations, any single industry categorization is likely to be inadequate.

In contrast, the R group demonstrates company performance equally out of line with industry norms, but in this case companies which are outperforming their rivals (mean $scp_j$). The individual segments are also outperforming their industry norms on average (mean $ssp_j$) but are highly variable (variance $ssp_j$ and mean $assp_j$). The portfolio effect is lower than for RC (but the difference is not statistically significant) but still statistically greater than for group N. The frequency of companies that have the largest reported segment that is not coincident with the company industry suggests a misclassification of the company. Once again the segment report provides valuable information as it explains the apparent overperformance at the consolidated level by the mismatch of the company industry with the classification of the largest industry segment. In addition, it emphasizes that the unusually good company performance is underwritten by unusually good segment performance. Evidence of a portfolio effect and compliance with GAAP is also apparent.

The C group is characterized by company and segment performance consistent with industry norms, the second highest portfolio effect (statistically greater than group N) and the lowest percentage of unallocated assets (statistically significantly less than groups R and N at the 5 per cent level). The high percentage of companies with a largest reported segment whose industry category is the same as the company (64 per cent), coupled with the low percentage of companies with a dominant segment (36 per cent), suggests vertical integration. That is, there is a large but non-dominant segment that coincides with the company industry but also has sufficient diversification to ensure stable consolidated results. The very low absolute value for the consolidated difference from the company's industry norm (mean $scp_j$) suggests that for this group the segment report has little opportunity to add to the consolidated results. However, the comparability of the segment results with their own industry norms confirms the consolidated results. Whilst new information is not being added by the segment report it does confirm the consolidated results via the segment comparability.

The striking features regarding the N group are the very low level of the portfolio effect (statistically smaller than all three other groups) and the highest value of percentage of unallocated assets (statistically greater than groups RC and C). In addition the individual segmental results are more variable in comparison with their industry norms than groups RC and C, although less than group R (mean $assp_j$). This suggests a situation where the consolidated results are in line with the company industry norm, the individual segments are out of line with their industry norms, there is no portfolio effect and the percentage of unallocated assets is high. It is difficult to see how the segmental data, under any circumstances, could improve understanding of the consolidated figures.

When interpreting the characteristics of companies within each group, the statistical significance of the test has guided our inferences. In all but one group, group N, an intuitive understanding of the results can be offered. Yet the intertwining of the relationships revealed is intricate. For example, groups R and N both display higher variability of segment performance against industry norms than the other two groups. The percentages of unallocated assets are also similar and higher than the other two groups. The major distinguishing feature is the lack of a portfolio effect for group N whereas it is pronounced for group R.

The facts related to group N are difficult to interpret. Neither the consolidated industry benchmark nor the individual segment benchmarks appear appropriate to describe performance. Absence of a portfolio effect confounds interpretation. At the very least, the segment identification policies of this group of companies are worthy of further investigation. The high percentage of unallocated assets in group N suggests an element of idiosyncratic, non-GAAP accounting procedures which is consistent with the use of the management approach in identifying the segments. What the characteristics of this group underscore are that for a minority of companies the management approach does not guarantee useful segmental data. It may be argued that the management approach is also followed by companies in group R, but here the incidence of a high portfolio effect leads to relevant disclosure. In the case of group N companies, no such portfolio effect is identified and the performance of the segments remains an enigma in relation to the consolidated performance and segment industry norms.

## CONCLUSIONS AND IMPLICATIONS

The identification of reportable segments and the inextricable association with useful segmental data disclosure has long been recognized. Over many years researchers and standard setters have explored alternative means to identify segments culminating in the recent North American adoption of the management approach. This approach emphasizes the relevance of the disclosed segmental data over its comparability. A novel research design is adopted here to gain preliminary insights into the possibility of the simultaneous achievement of relevance and comparability and their possible trades-off.

This research adopts the perspective of users by identifying groups of companies in which prima facie evidence of the existence of relevance and comparability in segmental data occurs. Whilst the majority of our sample companies reflect one or other or both of the characteristics, around 20 per cent of the sample companies appear to display neither relevance nor comparability. These companies are characterized by consolidated results close to the company industry norm, highly variable segmental performance in comparison with the specific industry norms, little evidence of a dominant segment or company industry being coincident with the industry of the largest reported segment. Yet there is virtually no portfolio effect between the segments. In addition, high levels of unallocated assets indicate that idiosyncratic accounting procedures are being adopted to provide 'financial information that an enterprise's decision makers use' (FASB, 1997, para. 5) which reflects the adoption of the management approach to segment identification. In this case it is difficult to detect the existence of either relevance or comparability in the segmental disclosure.

To suggest that the companies in group N are those following the management approach may be premature at this time. The source and size of data used, the metrics of performance and relative performance and the choice of explanatory variables are all part of a research design which is based on publicly available information. Explanation of the segment identification and segmental data policies of the companies in group N might well be complemented by an alternative method of investigation, such as company interviews. However, on the basis of this publicly available information and the series of tests conducted in this research, a clear implication is that the adoption of the management approach alone will not guarantee improved relevance of the segmental disclosure. Rather, the results underscore the complementarity between relevance and comparability. We find that in group R, sample companies' comparability is lacking. However, in this case the nature of the segments disclosed explains and adds to the consolidated disclosure by providing relevant data. In the case of group N no such explanation is obvious.

For companies of the type in group N, a focus on relevance alone appears inadequate to generate useful segmental data. Under these circumstances, managers of capital are likely to request more disclosure concerning the activities of specific reported segments and knowledge of internal reporting conventions which may well extend beyond net asset allocations. Without such additional disclosure, it is difficult to perceive external managers of capital maintaining an analytic advantage by being able to make meaningful comparisons or, at least, to place consolidated and segment performances in meaningful industry contexts.

For regulators, the important question posed by the present results is whether an emphasis on relevance might lead to confusing disclosure when comparability is sacrificed. By degree, a balance between relevant and comparable segmental data seems needed unless additional, detailed disclosure on internal corporate operations and internal reporting conventions are to be provided.

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## APPENDIX

## EXTEL AND LOTUS ONE SOURCE INDUSTRY CLASSIFICATIONS

| Extel industry classifications | | One Source industry classifications | |
|---|---|---|---|
| **Mineral extraction** | Leisure and hotels | Agriculture and horticulture | Medical and other health service |
| **General manufacturing** | Media | Air transport | Metal manufacturing |
| **Consumer goods** | Food retailers | Banking and finance | Mineral oil processing |
| **Services** | General retailers | Business services | Miscellaneous transport services |
| **Utilities** | Breweries and pubs and restaurants | Chemicals | Nuclear fuel production |
| **Financial** | Support services | Coal extract and manufacturing | Other inland transport |
| **Investment trusts** | Transport | Coke ovens | Other manufacturing |
| Extractive industries | Other services | Commission agents | Other services |
| Oil—integrated | Electricity | Construction | Owning and dealing in real estate |
| Oil—exploration and production | Distributors | Education | Personal services |
| Building and construction | Gas distribution | Electrical and electronic engineering | Postal services and telecommunications |
| Building materials | Telecommunications | Extraction of mineral oil and natural gas | Processing of rubber and plastics |

| Extel industry classifications | | One Source industry classifications | |
|---|---|---|---|
| Chemicals | Water | Extraction and preparation of metal ores | Production and distribution of electrical, gas and other |
| Diversified industrials | Retail banks | Extraction of minerals | Production of man-made fibres |
| Electronic and electrical | Insurance | Fishing | Public administration |
| Engineering | Life assurance | Food, drink and tobacco group 2 | Railways |
| Engineering—Vehicle | Other financial | Food, drink and tobacco group 1 | Recreational and cultural services |
| Print and paper and pack | Property | Footwear and clothing | Renting of movables |
| Textile and apparel | Investment trusts | Forestry | Repair of cons goods and vehicles |
| Alcoholic beverages | Split cap investment trusts | Hotels and catering | Research and development |
| Food manufacturers | Off-shore investment companies | Instrument engineering | Retail distribution group 1 |
| Household goods | | Insurance, excluding compulsory | Retail distribution group 2 |
| Health care | | Manufacturing of leather, leather goods | Sanitary services |
| Pharmaceuticals | | Manufacturing of metal goods | Scrap and waste materials |
| Tobacco | | Manufacturing of motor vehicles and parts | Sea transport |
| | | Manufacturing of non-metal mineral productions | Supporting services to transport |
| | | Manufacturing of office machinery and DP equipment | Textiles |
| | | Manufacturing of other transport equipment | Timber and wood furniture |
| | | Manufacturing of paper production, public and printing | Water supply |
| | | Mechanical engineering | Wholesale distribution food, drink and tobacco |

*Note*: Titles in bold represent larger industry groupings which include a number of the more detailed industry groupings.

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# Accounting for Private Estates and the Household in the Twentieth-Century BC Middle Kingdom, Ancient Egypt

This article examines the role of accounting in running the household economy and private estates in ancient Egypt. Drawing on translations of original accounts and business letters dating back to the Middle Kingdom, a number of diverse accounting roles are isolated. Firstly, the accounts and business letters shed interesting light on the determination of rations for individual members of the owner's household during a period of hardship caused by high Nile inundation. Accounting calculations were an instrument of both planning the economy of the household and underpinning a specific pecking order of the relative standing of individual members of the household. Secondly, the accounts and business letters were used as a means of facilitating the 'management at a distance' of the affairs of the private estate, while the owner was absent having entrusted its day-to-day running to his agents. Not only were targets of performance set for the expected crop from the cultivation of the land owned, but also of land to be rented for cultivation. Finally, calculations were made to account for the manufacture of textiles from flax. The quantification produced by accounting calculations rendered the activities of human agents visible to the owner acting at a distance. Moreover, even when dealing with concrete, visible commodities, such as grain, the intervention of accounting sharpened this visibility by converting the concrete into an abstract theoretical value via the use of 'monies of account' to attain a measure of economic and social reciprocity.

**Key words:** Accounting; Ancient Egypt; Hekanakhte; History.

The role of accounting in the household and private estates has received some, but by no means sufficient, attention in the literature (see Walker and Llewellyn, 2000). Napier (1991) and Harvey (1994) offer interesting insights into aristocratic and manorial accounting. Similarly, Fagerberg (1954), Myatt-Price (1956), Boys (1995), Woolgar (1992, 1993), Walker (1998, 2000) and Walker and Llewellyn (2000) have provided important contributions to household accounting. Moreover, there are numerous publications advising the household on how to manage their finances and keep their accounts (e.g., Haskins, 1903; Hancock, 1979; *Good Housekeeping*

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*Diary and Accounts Book 1996*, 1995). These contributions point to the importance of the role of accounting in different sociopolitical and economic contexts.

Nevertheless, our knowledge of the extent of diversity of the roles of accounting practices in the household and in private estates remains at an embryonic stage. More work is needed to further our understanding of the roles of accounting in this area, as evidenced by a recent call for more involvement of researchers in 'accounting at home' (Llewellyn and Walker, 2000, p. 418) and one of the aims of this article is to respond to this call by focusing upon the multiplicity and diversity of the roles of accounting in the social and economic contexts of the household. Further, previous research derives from relatively more recent episodes of history, ranging from AD 1417 to 1476 (Myatt-Price, 1956) to 1910–39 (Walker, 2000). Another aim is to explore the extent to which the centrality of the roles of accounting in the household and in private estates reported by these researchers was paralleled in more ancient societies, such as that of twentieth-century BC ancient Egypt. The major temporal gap between the periods examined by previous studies and the one examined here (between 3,400 and 3,900 years) may lead to the investigation of a different range of issues because of differences in the prevailing socioeconomic contexts. For example, in contrast to the period examined here, previous studies were not concerned with the role of monies of account since coinage money was already in use.

This article considers how accounting practices and techniques made possible the quantification and recording of a wide range of activities in the household and private estates. The extent to which accounting calculations underpinned the determination of grain rations to the household in a manner that was sensitive to the economic climate at the time is explored. The article shows how accounting-based rations reflected the individual status of different members of the household, resulting in differential rations within the same economic conditions. The analysis then considers the roles played by accounting calculations in assigning responsibility for certain tasks to a specific individual (agent), and how this individual accounted for his actions to the owner of the estate. Specific performance targets, such as land produce of grain, were stipulated and prices for specific activities, such as land rents, were determined. The analysis also deals with accounting for debts outstanding and their collection, and the relative prices stipulated for particular goods using specific counting methods and monies of account. Finally, the article explores the implications of these accounting roles and the ability to translate value across different monies of account for economic relationships in particular, and social relations in general.

What is clearly evident from my analysis is the power of accounting in shaping and constructing economic and social relations of the household and private estates. Accounting provides several metrics which convert activities and commodities into apparently precise quantities which can be acted upon by social and economic agents. This quantification renders activities of human agents visible to principals acting at a distance. Moreover, even when dealing with concrete, visible commodities, such as grain or bulls, the intervention of accounting sharpens this visibility, ironically by converting the concrete into an abstract theoretical value.

But thanks to such a translation of the concrete into the abstract, commodities become the site of a multitude of human actions, for example, further division into smaller amounts, consideration of alternative uses of the commodities, and facilitation of exchange with other commodities in more precisely denominated values.

The remainder of this article is structured as follows. The next section shows how the economy of the household and activities of a private estate were managed in the absence of the head of the family, and how accounting defined and facilitated the economic activities and the social status of members of the household. This is followed by an analysis of some transactions involving private debt and its collection. An assessment of the wealth of a landlord is attempted, and the economic and social implications of his decisions are examined. While many of his actions could be explained within the framework of economic reason, the article argues that there is a serious danger of pushing this argument too far. The final section considers the main implications of the evidence for the roles of accounting in organizations and society.

## MANAGING PRIVATE ESTATES AND THE HOUSEHOLD

The evidence examined in this article derives from the Hekanakhte Papers whose background is described below.

### *The Hekanakhte Papers*

The Hekanakhte Papers contain business letters and accounts relating to the administration of two private estates and one household while the owners were away on business, and were dated by James (1962, p. 6) to 2002 BC (year 8 of the reign of Menthuhotpe, Eleventh Dynasty), although Goedicke (1984, p. 9) has proposed changing the date to 1986 BC (year 5 of the reign of Amenemhet I, Twelfth Dynasty). These documents never reached their intended destination as they were discovered, the seals still on them, in an old tomb, with the messenger carrying them (Siahathor, presumed to be Hekanakhte's son) from the north to the south of Egypt having either thrown them away or been killed while en route. The pack contains four letters and four accounts.

The Hekanakhte Papers are particularly valuable for several reasons. First, they have survived almost intact, with their rich contents accessible. Second, they deal with a wide range of transactions involving distribution of rations and provisions, land renting, payment for manufactured products such as linen, and debt collection. Third, they cover a few years spanning quite different economic circumstances ranging from normal (relatively prosperous) times to hardship caused by high inundation of the Nile. In commenting on their importance, Baer (1963, p. 1) states:

> the two letters that Hekanakhte sent to his family are unparalleled in ancient Egypt, both for the light that they shed on the personality of an elderly farmer living in the fall of 2002 BC and for the inherent interest of the matters discussed in them. They are virtually the only source of Egyptian agriculture before the New Kingdom and the sole surviving texts from ancient Egypt to give the cultivator's point of view rather than that of the administrative landlord.

Hekanakhte was staying in Memphis in the north of Egypt, visiting his estate in Nebesyt in the south only occasionally. While away from the estate, he instructed his agent on matters relating to the administration of his affairs and household, but finalizing them during his visits. Three translations of the Hekanakhte Papers are available: James (1962), Baer (1963), and Goedicke (1984). Moreover, Wente (1990) translated the letters only. There are disagreements in the reading of some of the details, with the translations offered by James, Baer and Wente being more similar. The translation by James (1962) is used here because it is considered the most authoritative by Egyptologists. While there is an element of overlap in terms of the activities covered by individual letters and accounts, each tends in the main to deal with a distinct set of issues.

## *Accounting for the Household*

FIGURE 1

THE HEKANAKHTE PAPERS: LETTER II

(1) A son speaks to his mother; the *ka*-servant Ḥeḳanakhte to his mother Ipi, and to Ḥetepet: How are you? Are you alive, prosperous and healthy? In the favour of Monthu, Lord of Uaset! (2)—and to the whole household: How are you? How are you? Are you alive, prosperous and healthy? Do not worry about me. See! I am healthy and alive. (3) See! you are that one who ate until he was satisfied and hungered until his eyes sunk (into his head) (?). See! the whole land is perished while [you] are not hungry. [See!] (4) when I came hither southwards I had fixed your rations properly. [Now] is the inundation [very great (?)]? See! [our] rations are fixed for us (5) according to the state of the inundation. Be patient, like names. See! I have reached today among you, nourishing you.

—Rations should be measured for Sinebnut (6) from his barley which he had on his threshing-floor(?), until he leaves Perha'a—

| | |
|---|---|
| (7) Account of the rations of the household: | |
| (8) Ipi | 8 *ḥeḳat* (?) |
| (9) Her maidservant | |
| (10) Ḥetepet | |
| (11) Her maidservant | 8 *ḥeḳat* (?) |
| (12) Ḥeti's son Nakhte | 8 *ḥeḳat* (?) |
| (13) Together with his family | |
| (14) Merisu <and> his family | 8 *ḥeḳat* (?) |
| (15) Siḥatḥor | 8 *ḥeḳat* (?) |
| (16) Sinebnut | 7 *ḥeḳat* (?) |
| (17) Anupu | 4 *ḥeḳat* (?) |
| (18) Snofru | 4 *ḥeḳat* (?) |
| (19) Si-inut(?) | 4 *ḥeḳat* (?) |
| (20) M'ay's daughter Ḥetepet | 5 *ḥeḳat* (?) |
| (21) Nofret | 3½ *ḥeḳat* (?) |
| (22) Situret | 2 *ḥeḳat* (?) |
| (23) Total | 7 *khar* 9½ *ḥeḳat* (?) |

(24) If you avoid being angry about this, (25) See! the whole household are like my children; (26) everything is mine—(for it is said) that 'half-life is better than death outright'. (27) See! one says 'hunger' about hunger. See! they are beginning (28) to eat men here. See! there are no people to whom those rations are given anywhere. You shall conduct yourselves with stout hearts until I have reached (29) you. See! I shall spend the *shōmu* here.

Communication by the *ka*-servant Ḥeḳanakhte to Merisu and to Ḥeti's son Nakhte subordinately. You are to give those (30) rations to my people while they are doing work. Take great care; hoe all my land; sieve with the sieve; hack with your noses (31) in the work. See! if they are diligent god will be praised

FIGURE 1

CONTINUED

for you and I shall not have to make things unpleasant for you. Now one should begin by giving the (32) rations about which I have written to you, on the first day of Khentkhetiperty, for a new first day. Do not be neglectful then (33) about the 10 *arouras* of land which are in the neighbourhood and which were given to Ip the Younger's son Khentykhe—about hoeing it. Be very diligent. See! you are eating my rations.

(34) Now, any possession of Anupu's which you have, give it (back) to him; whatever is lost, make it up to him. Don't make me write to you about it another (35) time. See! I have written to you twice about it. Now if Snofru does want to be in charge of those bulls, you should put him (36) in charge of them. Now he did not want to be with you cultivating, going up and down; nor did he want to cone hither with me. Whatever else he wants (37) you should let him enjoy what he wants. Now anyone who will reject those rations out of the women and men, (38) he should come to me here (to be) with me and live as I live. Now there is no one who has come here to me.

I said to you: 'Do not keep away (39) a companion of Ḥetepet's from her, whether her hair-dresser or her domestic servant(?).' Take great care of her. May you prosper (40) in all things thus. Now (if) you do not want her, then you should send Iutenḥeb to me. As this man lives for me—I speak of (41) Ip—he who shall commit any act upon the person (?) of (my) concubine, he is against me and I am against him. See! this is my concubine (42) and it is known what should be done for a man's concubine. See! whoever will do for her the like of what I have done—Indeed, would anyone of you (43) be patient if his wife had been denounced to him? Then shall I be patient! How can I be with you in the same establishment? (44) No! You will not respect (my) concubine for my sake.

(*vs.* 1) Now see! I have sent you by Siḥatḥor 24 copper *debens* for the renting of land. Now let (*vs.* 2) 5(?) *arouras* of land be cultivated for us on rent in Perha'a beside Hau the Younger('s land), with copper or with clothes or with barley (*vs.* 3) [or with anything (else)], but only when you have collected the value [there(?)] of oil or of anything (else). Take great care; be very diligent; be watchful. (*vs.* 4) Now [see!] you are on good unworked (?) land of Khepeshĕyet.

(*vs.* 5) What the *ka*-servant Ḥeḳanakhte gives (*vs.* 6) to his household of Nebesĕyet.

*Source*: James (1962).

Letter II specifies the rations for Hekanakhte's household and, hence, it is a sort of a plan for the purpose of provisioning for the family. As evidenced from Letter II, Hekanakhte has always determined the rations on the basis of the size of the Nile inundation. While he was away in Memphis, the size of the inundation increased substantially thereby necessitating a scaling down of previous rations. He fixed new rations for every member of the household and instructed his agent Merisu to follow these rations. The rations are expressed in hekat measures of barley, with one hekat equalling one-tenth of one khar (in the New Kingdom one khar had a capacity of 76.88 litres; see Janssen, 1975, p. 109). The total of all the rations is stated as 7 khar and 9.5 hekat measures, one more khar measure than the aggregate of the individual rations. Both James (1962, p. 34) and Baer (1963, p. 7) have suggested that the total was the correct aggregate of previously written rations which were later reduced through new writing but without changing the total.

What the letter does not show is how low the new rations were compared to the previous ones. The reductions must have been sizeable because Hekanakhte was careful to tell his household how lucky they were to have the lower rations given the suffering of others, including himself. Hekanakhte makes it clear that the new rations are to be applied from the beginning of the next month, and are to be continued until the completion of the next harvest. When comparing the rations of 8 hekat measures for each of Nakhte, Merisu and their families against the 4 hekat measures for Snofru (a favoured boy; see in Letter III) or the 5 hekat measures fixed for M'ay's child Hetepet, it appears as if the allocation of rations was not fair on the families. This has led James (1962) to surmise that older members of the household with dependants must have had other sources of income, but there is no evidence to support this. The rations in general were fairly tight, reflecting the crisis caused by the high inundation. Baer (1963, p. 7, note 49) has suggested in commenting on the ration of 8 hekat measures allocated to Ipi and her maidservant that such rations are close to half the normal rations. He estimates that 8 hekats of barley per month amount to about 2,600 calories per day which is insufficient for two adults even after supplementing with fruit and vegetables.

Later on in the letter, Hekanakhte turns his attention to economic matters. He instructs his agent Merisu to rent land in Perha'a using some good valued by him at 24 copper debens, but he considers a number of possibilities including cloth, barley, oil, or indeed anything else that would ensure clinching the deal. As shown in Letter I below, the good he values at 24 copper debens becomes more specific in the form of a piece of cloth woven in Memphis and sent along with the letters.

This intervention of accounting in the management of household affairs has several implications. First, through accounting Hekanakhte was able to stipulate to a chosen agent precisely how the economic domain of the household was to be managed in his absence, thereby allowing Hekanakhte to monitor his affairs at a distance. Second, the agent had a clear plan of how to proceed in managing the household and how to account for his actions to the absent principal. Third, as the economic wellbeing of the household was highly dependent upon the size of the Nile inundation, the principal was able to link rations in any year to the size of the inundation and also to the minimum standard of living for his family. Fourth, the accounting intervention reinforced the social structure of Egyptian society both in terms of the level of rations and pecking order. In Letter II, Ipi, Hekanakhte's mother, and Hetepet, generally deduced to be his aunt, head the list and each (along with her maidservant) were allocated the highest ration of 8 hekat measures which was only achieved by three other members of the household with their families. This gives an indication of the respect and appreciation in which elderly members of the household were held. There follows a listing of the rations for seven males (some with their families) and three females who are presumed not to be among the elderly. Fifth, although Hekanakhte decides on the rations himself, he still implies the importance of consensus over the rations by the recipients. Hence, the apparent accuracy and transparency of the accounting intervention was underpinned by social harmony and consensus. Sixth, as only a very small percentage of ancient Egyptians were literate, it is unlikely that either Hekanakhte or his agent were literate. Hence, Hekanakhte would have had to rely on a professional scribe to write the letters and accounts, and his agent would have had to call upon a scribe to read them. This dependence of both the principal and agent upon scribal expertise may have produced power/knowledge relations that acted to enhance the social role of accounting and scribes, as the literate, calculating men.

## *Accounting for the Economic Affairs of the Farms and Managing at a Distance*

FIGURE 2

THE HEKANAKHTE PAPERS: LETTER I

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(1) Communication by the *ka*-servant, Ḥeḳanakhte, to Merisu: Whatever is inundated in our land—it is you who are cultivating it—woe to all my people and to you! See! (2) I consider you responsible for it. Be very energetic in cultivating; take great care! My seed-corn should be looked after; all my property should be looked after. See! (3) I consider you responsible for it. Take great care of all my property.

Get Ḥeti's son Nakhte to go down with Sinebnut to Perha'a (4) to cultivate [for us] 5 *arouras* of land on rent; and they shall take its rent from the *mn*-cloth woven where you are. Now if they have collected (5) the value in exchange for the emmer that is in Perha'a, they shall use it there also. You will have no more concern then with the (6) *mn*-cloth about which I said: 'Weave it, and they shall take it when it has been valued in Nebesēyet and rent land against its value.' Now if (7) it pleases you to cultivate 5(?) *arouras* of land there, cultivate it. And you shall sow land—2½ *arouras* of land with emmer and 2½ *arouras* of land with barley—(8) [good] land [of] Khepeshēyet. Do not go down on to any man's land. You shall ask for (some) from Hau the Younger. If you do not find (any) (9) with him, then you shall go before Hrunufe; it is he who can put you on to unworked(?) land of Khepeshēyet.

Now see! when I came (10) hither southwards you had reckoned to me the rent of 7½ *arouras* of land in barley [alone]. Take great care! Avoid (11) purloining (one) *khar* of barley therefrom. Do not sow with the barley belonging to it, because you have made the renting of it unpleasant, as far as I am concerned, with barley alone and (12) its seed. Now see! as for one who has sown with barley—as for the barley, 69(?) *khar* in 7½ *arouras* of land is 9 *khar* of barley in one *aroura* of land. See! (13) it is not a bad yield. See! 10 *arouras* of land (ideally) equal(?) 100 *khar* of barley. Take great care! Avoid dealing arbitrarily (14) with one *ḥeḳat*(?) from it of barley. See! this is not the year for a man to be lazy in respect of his master, his father or his brother.

Now as for (15) everything that Ḥeti's son Nakhte will do for (me) in Perha'a,—See! I have not reckoned an allowance for him beyond one month, namely, one *khar* of barley. (16) I shall reckon another second (allowance), namely, 5 *ḥeḳat*(?) for his family upon the first day or the month. See! if you disobey this, see! I shall lay it upon you as purloining. (17) Now as for this which I told you, saying: 'Give him a *khar* of barley per month', you are to give him in fact 8 *ḥeḳat*(?) of barley per month. Take great care!

(*vs.* 1) Now what about that sending Siḥatḥor to me with old, dry barley that was in Djedisut, (*vs.* 2) without my being given those 10 *khar* of barley in good new barley? Is it not the case that you, therefore, are happy, eating good barley, while I am neglected? Now the boat (*vs.* 3) is moored at your town and you are doing in fact all evilness. If you had sent me the old barley in order to keep together that (*vs.* 4) new barley, what could I say?—'How good it is!'—But if you have not reckoned for me a single (*ḥeḳat*) of barley from the new barley, I shall not reckon it for you (*vs.* 5) for ever.

Now I have been told that Snofru. . . . Take great care of him. Give him an allowance. And greet (*vs.* 6) Snofru—as Khentykhe says—a thousand times, a million times. Take great care! and write to me. Now if my land is inundated while he is cultivating (*vs.* 7) with you and with Anupu, woe to you and to Siḥatḥor! Take great care of him. You shall send him to me after the cultivating. Get (*vs.* 8) him to bring me 3 *khar* of wheat together with what you can find of barley—but only in excess of your allowances until you reach the *shōmu.*

(*vs.* 9) [Do not neglect] everything about which I have written to you. See! this is the year for a man to work for his master. Now as for all the affairs of my estate(?), (*vs.* 10) and all the affairs of my farm(?) in . . . wy, I have sown it with flax. Do not let anyone go down(?) upon it. Now as for anyone who shall speak (*vs.* 11) to you, you shall go upon it . . . (?). Now sow that farm with barley; do not sow emmer in it. Now if it turns out to be a big inundation (*vs.* 12) you shall sow it with emmer.

Take great care of Anupu and Snofru; you die with them and you live with them. Take great care! See! there is no one more important (*vs.* 13) than he in that house with you. Do not be neglectful about it (i.e. the situation). Now have the housemaid Senen turned out of my house—take great care!—(*vs.* 14) on whatever day Siḥatḥor reaches you. See! if she spends a single day in my house. . . . (?); it is you who let her do evil to my concubine. (*vs.* 15) See! why should I make it unpleasant for you? What can she do to you—the five children? And greet my mother Ipi, a thousand times, a million times. (*vs.* 16) And greet Ḥetepet and the whole household and Nofret. Now what about that doing evil to my concubine? You have done for yourself(?). (*vs.* 17) Are you established with me as partner? If you desist, how good it is!

And send an account of what is to be collected, being the produce of Perha'a. Take great care! Don't be neglectful.

(*vs.* 18) What the *ka*-servant Ḥeḳanakhte gives (*vs.* 19) to his household Nebesēyet.

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*Source*: James (1962).

Letter I is mainly concerned with the management of economic affairs and only at the very end deals with some matters of the household.[1] The first part of the letter contains a reminder to Merisu of his responsibilities towards Hekanakhte's property, land ploughing, grain seed and members of the household. The second part relates to renting 20 arouras (one aroura is about two-thirds of an acre; see Gardiner, 1957, p. 266) of desirable land (land of Khepesheyet) in Perha'a (mentioned briefly at the end of Letter II), a task which is to be assigned by Merisu to Nakhte. As the other letters reveal, the choice of Perha'a is deliberate for Hekanakhte already has business interests there. Half the rented land is to be cultivated with emmer and half with barley. Negotiations for land rental were to be conducted only with Hau the Younger, and failing that, Hrunufe, who was an official at Perha'a responsible for administering landed property. The cloth was to be sent with the letters as payment for land rental, and was valued in Letter II by Hekanakhte at 24 copper debens. Because this is a personal valuation, Hekanakhte instructs his agent to have the cloth valued in Nebeseyet (his home town) before taking it to Perha'a. Hekanakhte seemed prepared for the possibility that the cloth may be valued at less than twenty-four copper debens in which case some debts (to be collected in the form of emmer) he is owed would be added to the agreed price of the cloth in order to rent the land.

The third part of the letter deals with the 69 khar (sacks) of barley from 7.5 arouras of land collected by Merisu for Hekanakhte which seems to be the produce of a joint ownership to be shared equally by both men. Baer (1963, p. 4); Goedicke (1984, p. 43) and Wente (1990, p. 59) all read these figures as 65 khar produced from 13 arouras, thereby giving a yield of 5 khar measures. This share, Hekanakhte contends, is fair as it represents a conservative assessment of the produce, since 10 arouras of land should produce at the very least 100 khar of barley (line 13); hence the share of 5 khar from one aroura mentioned in the letter. As this quantity of barley belongs to Hekanakhte, it was not to be used by Merisu for another venture, nor indeed to be misappropriated by him.

The fourth part of the letter stipulates the wages or rations to be paid to Nakhte, Hekanakhte's agent, to deal with the land to be rented in Perha'a. Initially, Nakhte's ration is fixed by Hekanakhte at one khar (10 hekat) of barley in addition to 5 hekat for his family left behind in Nebeseyet. Nakhte's personal ration of one khar (10 hekat) measures was quickly reduced by 20 per cent to 8 hekat measures. Goedicke (1984, p. 41) reads negative meanings in this: 'This seeming act of munificence has only a slight flaw. It seems that Hekanakhte had second thoughts about his payment to Nakhte and thus instructs Merisu to cut it twenty percent. Aside of its economic and human sides—it seems that Hekanakhte was not excessively fond of Nakhte.'

However, I take issue with this reading on two accounts. First, even with the reduction of 20 per cent, Nakhte and his family were allocated 13 hekat, much higher than the highest allocation fixed in Letter II, including that of the main agent Merisu and his dependants. Any suggestion of relative exploitation of or dislike for Nakhte is difficult to reconcile with this point. Second, it is possible that Letter I was written over a number of days, or indeed weeks. If this were the case, the allocation of one khar (10 hekat measures) may have been based on a more optimistic expectation of the size of the inundation. As more reliable information suggested a much higher (worse) inundation, a scaling down of Nakhte's allocation by 20 per cent would be consistent with the scaling down of rations indicated in Letter II.

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[1] The translation made by James (1962, pp. 13–14) of this account used here varies significantly from that made by Goedicke (1984, pp. 43–5), particularly with respect to the numbers of arouras of land. The figures translated by James are not supported by the calculations (see later).

The remainder of the letter covers a number of other items. It complains about Hekanakhte being previously sent old, rather than new, barley with a clear instruction that from then onwards all deliveries to him had to be in fine new barley. It also instructs Merisu that Hekanakhte's inundated land must be ploughed and cultivated with barely, and only with emmer in case of high inundation, but on no account should it be leased. Finally, there are other details concerning the household, such as protection of the rations of Snofru, whom Merisu had reported for being lazy, and Anupu, as well as Hekanakhte's wife. The letter concludes by requesting an account from Merisu for the collection of outstanding debt from Perha'a.

Letter I then combines an interesting number of issues of economic significance for Hekanakhte's estate where accounting calculations played a key role. In the main, the letter specified clear instructions to the agent, Merisu, concerning land rental, valuation of goods (a cloth), land ploughing and cultivation, wages to be paid to other members of the household acting as other agents for Hekanakhte, and accountability over his share of barley produced from joint ownership of land and also over collection of outstanding debt. Even when these responsibilities are stated in descriptive terms, for both agent and principal there is an easy way of quantifying and valuing activities and items involved given that they both inhabited a world in which accounting and 'money of account', as the khar and the deben, existed.

FIGURE 3

THE HEKANAKHTE PAPERS: ACCOUNT V

(*Account I*)

| | | | | |
|---|---|---|---|---|
| (1) | Regnal year 5, month 2 of *shōmu*, day 9. | | | |
| (2) | Account of the barley of Ḥeḳanakhte | | | |
| (3) | which he handed over to Merisu: | | | |
| (4) | New barley | | | 112 (*khar*) (?) |
| (5) | New Emmer | | | 63 (*khar*) (?) |
| (6) | [Old barley(?)] | | | 10 (*khar*) (?) |
| (7) | Flax, bundles | | | 600 |
| (8) | Flax, bundles | | | 500 |
| (9) | The total (10) of <bundles> is 1100. | | | |
| (11) | His produce for the bulls: barley, 4 (*khar*), emmer 10.5 (*khar*). | | | |
| (12) | Equivalent to the barley which Ḥeḳanakhte fixed for his tenant-farmers: | | | |
| (13) | Siḥatḥor | 40.6 (*khar*) | bundles(?) | 100 |
| (14) | Merisu | 50 (*khar*) | " | 110 |
| (15) | Sinebnut | 40.6 (*khar*) | " | 100 |
| (16) | land—1 *aroura* of flax. | | | |
| (17) | 12 (*khar*) (?). | | | |

## FIGURE 3

## CONTINUED

(*Account 2*)

| | | |
|---|---|---|
| (18) | [Account] of the bulls which Ḥeḳanakhte handed over | |
| (19) | [to Si]nebnut: | |
| (20) | [Bulls(?)] | 3 |
| (21) | Cows [which have recently calved(?)] | 11 |
| (22) | Young cows(?) | 5 |
| (23) | Young bulls(?) | 1 |
| (24) | Bulls for teams | 15(?) |

(25) Now [if] Sinebnut calls to (26) [Ḥeti's son Nakhte about]the matter of a bull that (27) goes up(?), that he should catch it, and he does not go, (28) half of its price is upon him and (a half on) (29) Ḥeti's son Nakhte.

(*Account 3*)

(30) Account of the bread which Merisu gave to Ḥeḳanakhte:
(31) *šꜣšrt*-cakes 1000; *bḥśw*-loaves 500
(32) *tr-sst*-loaves 700
(33) The total of *tr-sst*-loaves is 6000.

(*Account 4*)

(34) Regnal year 8: Account of Ḥeḳanakhte's balance which is with Merisu:
(35) Barley 12.5 *khar*; 13 *khar* (emmer)
(36) Grand total, 25.5 (*khar*)

(*Account 5*)

| | | | | |
|---|---|---|---|---|
| (37) | Regnal year 8: Account of the barley and emmer which are outside: | | | |
| (38) | specified by each man by his name: | | | |
| (39) | Ishetni's son Senuḥotpe | 18 | (*khar*) | |
| (40) | The mayor Ḥetep-Khnumu | 7.5 | " | |
| (41) | Semekhsen's son Khety'ao | 4.5 | " | |
| (42) | Nefersedjeret's son Se'ankhsobk | 5 | " | (emmer) |
| (43) | Woseret's son 'Ankh | 5.25 | " | " |
| (44) | Kha's son Ipi | 1 | " | " |
| (45) | 'Ankhni's son Ipi's son Khentkhetiḥotpe | 3 | (*khar*) | (emmer) |
| (46) | Metjenet's son Khentkhetiḥotpe | 30 | " | " |
| (47) | Total: barley, 33 *khar*; 41.25 (emmer) | | | |
| (48) | Grand total: | 74.25 | *khar* | |

| | | | |
|---|---|---|---|
| (49) | Renenreḥet's son Ishetni | 3 | (*khar*) |
| (50) | Khety, the scribe | 1.5 | " |
| (51) | Shed's son Nakhte | 1.5 | " |
| (52) | Meru's son Khety | 1.5 | " |
| (53) | Shed's son Shed | 3 | " |
| (54) | Total: | 10.5 | *khar* |

(*Account 6*)

(*vs.* 1) Account of (pieces of) wood:
(*vs.* 2) Willow 5, in the rear part of the house(?)
(*vs.* 3) Mast in the forecourt.
(*vs.* 4) Pieces of moringa(?) wood 1
(*vs.* 5) Pieces of sycomore-fig wood 3, large
(*vs.* 6) *rwryt*-board 1
(*vs.* 7) Cabin of willow, equivalent to 60 planks.
(*vs.* 8) *ỉm*-trees 4
(*vs.* 9) Acacias 5
(*vs.* 10) Acacia beams 1, large.

*Source*: James (1962).

The most detailed document in the Hekanakhte Papers is Account V, which comprises six smaller accounts. The account contains numerous entries involving amounts of emmer, barley, bundles of flax, cakes and bread loaves, wood and twenty bulls of different types. The translations by James (1962, p. 53) and Baer (1963, p. 18) show a quantity of fresh emmer of 63 khar for the second entry at the beginning of the account. Goedicke (1984, p. 93) rejects this reading for palaeographic reasons and instead proposes a reading of 204 khar. James and Baer also read the emmer entry in line 11 as 10.5 khar compared to Goedicke's reading of 15 khar. Similarly, the quantities of barley to be given by Merisu to each of Siahathor and Sinebnut are read by both James and Goedicke as 40.6 khar, whereas Baer (1963, p. 18) reads them as 46 khar each. When James attempts to reconcile the figures of emmer and barley in the account, he re-reads the allocations to each of Siahathor and Sinebnut as 46 khar (see below). Finally, James reads the number in line 32 of bread loaves as 700 (compared to the reading of 3,700 offered by Goedicke) and then attempts to reconcile the individual entries of bread and cakes with the total of 6,000 listed on line 33 (James, 1962, p. 61).

In order to justify his reconciliation, James assumes that the first three entries of emmer and barley represent the quantity that Merisu was entrusted by Hekanahte to distribute among the household (1962, p. 55). For James, the barley and emmer to account for (measured in barley equivalent) is: 112 + 42 (63 emmer times two-thirds) + 10 = 164 khar. He accounts for this amount by adding the allocation for the bulls of 4 barley and 10.5 emmer converted to 7 khar barley, which gives 11 + the allocations to Siahathor (46) + Merisu (50) + Sinebnut (46) + 12 (line 17) to give a total of 165 khar. Having arrived at these figures, James states (p. 57): 'There is then a discrepancy of 1 *khar* between the two totals, an error not sufficient to invalidate the solution. Complete agreement could be achieved if the figure 64.5 were read in l. 5 [instead of the 63]; it has been suggested above that this figure was originally written there. There can be no certainty that these calculations are correct, but they do provide a solution for the problem of how to reconcile the two parts of Account I.'[2]

However, this attempt to reconcile the top two parts of the account comes at a very high price. Indeed, James has had to make several quantum leaps that are difficult to accept as being any more than 'plausible'. First, there is a charge of negligence against the ancient scribes (or whoever inscribed the accounts). While there are examples of scribal negligence over the long history of ancient Egypt, this cannot be used as a regular peg on which to hang problems of account reconciliation. Second, James decided to recalculate the allocations that he thought each of Siahathor and Sinebnut should receive, based on purely hypothetical reasoning.[3]

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[2] If the calculations are incorrect, it escapes me how they could still provide a solution to reconcile the two parts of the account as James asserts.

[3] James surmises that the amounts of flax and barley go together in some fixed proportion (1962, pp. 56–7). He assumes that the allocation of Merisu is correct, and therefore establishes that as a ratio of 110 flax to 50 khar barley. Using this ratio, he recalculates the allocations of barley for each of Siahathor and Sinebnut, assuming that their allocation of flax of 100 bundles is correct) as: 50 times 100/110 to get 45.4 hekat (instead of 40.6). He then decides to read 45.4 as 46, reasoning that 'Hekanakhte probably worked out the flax amounts according to the barley ratio and then took the result to the nearest ten bundles' (p. 57) without offering a shred of evidence to support his contention.

Third, if the reading of line 5 offered by Goedicke as 204 khar of emmer (equivalent to 136 khar of barley) rather than the 63 read by James is correct, then James' calculations would completely collapse for they would only account for 165 khar out of 258!

My preference is to avoid forcing all these assumptions onto the accounts in order to satisfy our own preferences to secure some sort of reconciliation which may have never been intended for the account in the first instance.[4] I contend Baer (1963, p. 18) is closer to the mark in arguing that 'it is safer simply to take the accounts as separate entities', and hence it is the wider economic and social implications of the accounts that are of interest.[5] Account V is particularly valuable for two reasons. First, it was written over three years and provides rich details of several economic goods. Second, it contains clear examples of responsibilities for specific tasks being entrusted to various agents (or sons) of Hekanakhte while he was away from his estate, and hence provides other examples of monitoring the performance of agents by the principal at a distance. Third, in contrast to Letters I and II which reveal much of the hardship felt during the period of high Nile inundation, Account V gives some interesting insights into the entitlements of members of the household during a relatively more prosperous period.

Account V contains specific instructions from Hekanakhte to his agents. Merisu was held responsible for the quantities of barley and emmer entrusted to him by Hekanakhte, and also for seeing to the distribution of the amounts of barley and flax that Hekanakhte has fixed for each of his tenant-farmers, including Merisu himself. Moreover, Merisu was held responsible for quantities of cakes and bread loaves. The prominence of Merisu in the documents suggests that he was the key agent, but other agents were also engaged: for example, Sinebnut was assigned the responsibility of looking after the bulls, perhaps because Merisu had a heavy burden.

Account V was written over the years 5–8, and by comparison, Letters I and II would have been dated immediately around the time when the high inundation and economic hardship occurred. The account shows large quantities of emmer and barley. Before departing for Memphis, Hekanakhte left with his household, at the most conservative reading, 73.5 khar of emmer (equivalent to 49 khar of barley), 126 khar of barley (268 if we accept Baer's suggestion of taking the different parts of the account as separate), and 1,410 bundles of flax. Given that the rations specified in Letter II for the year of inundation for the whole of Hekanakhte's household amount to 93 khar (6.95 + 0.8 for Hekanakhte per month multiplied by 12), a total of 175 khar (49 + 126) at least appears to offer a far higher subsistence level. Indeed, given that a number of the members of Hekanakthe's household who were mentioned in Letter II and included in the monthly allowance are not listed in Account V, it is possible that the provisions offered were even more generous. Against this, however, we have to consider the distinct possibility that the provisions were not entirely for household consumption but also included amounts of emmer and barley to be used as seed and also as annual payment for land rental.

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[4] In some parts of the account sensible reconciliation of numbers is possible. For example, the figure of 41.25 hekat on line 47 is the aggregate of the entries on lines 39–44; the grand total of 74.25 khar is the aggregate of 33 and 41.25 figures on line 47; and the 10.5 khar total on line 54 is the summation of the entries on lines 49–53.

[5] Some may argue that if the figures cannot be reconciled, then how can we place any meaning to the economic transactions they signify? I do not necessarily share this view for a number of reasons. First, those who inscribed these accounts and letters would have had them preserved in perfect condition and hence the difficulties of reading them in their less than perfect condition now by contemporary scholars would not have been faced by the ancient scribes. Second, part of the reason for the disagreement in reading the texts, even when they are well preserved, is that they were written in the more cursive, Hieratic form which would have been perfectly readable by the ancient scribes but not necessarily by modern scholars. Third, even when there are some incorrect entries, the economic implications of the other entries and the account in general should not be dismissed.

Another means of attempting to gain some insights into difference in provisions between 'good' and 'bad' years is to compare the figures for the same person over the two different years. In Account V, for example, Merisu was given 50 khar of barley for the whole year. In Letter II, he was given a provision of 8 hekat of barley, which over a whole year would come to 96 hekat (or 9.6 khar). The 50 khar of barley in Account V is more than five times the annual ration for Merisu and his family in the inundation year; a much too high a figure to be accepted. However, if the 50 khar is taken as Merisu's aggregate provisions for the three-year period of the account, then the average annual provision is 16.66 khar, fairly close to the rations which Baer (1963, p. 7) calculates to be the norm for a 'good' year.

FIGURE 4

THE HEKANAKHTE PAPERS: ACCOUNT VII

| | | | |
|---|---|---|---|
| | (*Account 1*) | | |
| (1) Account of emmer which is [in Ḥes-wer(?)]: | | | |
| (2) Low-lying ground | | | |
| (3) Storehouse | | 30.2 *khar* | |
| (4) Emmer | | 1.9 " | in the measure |
| (5) *mḫryt*-building | | 3.2 " | in the town |
| (6) House of Mentu-nakhte | | 23 " | |
| (7) House of Tjai's son Nakhte | | 2 " | |
| (8) [Total of] the month's provisions | | 60.3 ( " ) | in the town |
| | (*Account 2*) | | |
| (9) What is with Sitnebsekhtu, | | | |
| (10) being the balance of the yarn | 20 (bundles) | | |
| (11) on the first day of Shefbote. | | | |
| (12) Flax | 1020 | 60(?) | |
| (13) ....... | 7(?) | | |
| (14) [In the] magazine(?) | 10 *khar* | | |
| (15) Nefersebau begins with the rations in Rokeḥ(?) . . . for(?) Tep-oner(?). | | | |

(*vs.* 1) Account of the emmer which is in Ḥes-wer(?)
(*vs.* 2) What is with Sit(neb)sekhtu.

*Source:* James (1962).

Account VII does not belong to Hekanakhte but to Sitnebsekhtu, who is presumed to have been his friend or possible distant relation. The account contains three sets of information: (a) instructions concerning the distribution of grain in a place called Hes-wer; (b) the payment to be made by Sitnebsekhtu for the production of linen on her estate; and (c) the specific dates when the distribution of provisions was to begin. This combination of different purposes underscores the flexibility of accounting practices of the time which permitted the attending to multiple objectives within the confines of one account.

Concerning the distribution of grain, the total amount recorded as available is 60.3 khar (line 8), which is the summation of the entries in lines 3–7 representing how that total should be distributed. Of this total amount, the majority (53.2 khar) was targeted at the Storehouse and the House of Mentu-nakhte, the latter presumably a tenant farmer. Of particular note is the way in which the entries on lines 4 and 5 are specified. Line 4 indicates that a distribution of 1.9 khar emmer is to be made 'in the measure', which Goedicke (1984, p. 104) translates as 'exactly'. If Goedicke's translation is viable, then this entry signifies precise exactitude in payment hence ruling out the acceptability of a substitute payment. In contrast, line 5 shows the distribution of 3.2 khar in the 'mhryt-building' which Goedicke (1984, p. 104) translates as being acceptable in kind.

The second part of Account VII shows linen transactions. It is evident that the activities of this estate did not solely revolve around agriculture, but also included the making of yarn. Entries 9–10 show the delivery of a quantity of yarn (20 bundles) produced for Sitnebsekhtu. It would appear that Sitnebsekhtu was concerned with textile production on a commercial basis, and that her name suggests that she came from a family of weavers (Goedicke, 1984, p. 108). The key to understanding this part of the account is the entry on line 12 which specifies the quantity of flax as the raw materials used to produce linen, at the payment rate of one khar of grain per 60 bundles of flax. Goedicke (1984, p. 104) reads the second number on line 12 as 1/60 instead of 60; and James (1962, p. 69) has indicated that the reading of 1/60 is also possible. Given 1,020 bundles of flax at the conversion rate of 1/60, the total payment due for the manufacture of linen that used 1,020 bundles of flax is 17 khar. Of this amount, 7 khar is recorded on line 13, leaving a remainder of 10 khar relating to the (linen) workshop (line 14). The likely implication here is that the amount of 17 khar outstanding had to be paid in two sums (see Geodicke, 1984, p. 109).

The third part of Account VII (particularly line 15) indicates that the agent (or headman) Nefersebau employed by Sitnebsekhtu should begin to distribute the provisions only at a specific date which is difficult to read, but Goedicke (1984, p. 104) has suggested the reading 'when the head of the river had come down', that is, at the end of the inundation.

Account VIII (misplaced and translated later by James, 1968) shows a summary of the barley and flax produced by two types of landholding: the '*rw*' or what Goedicke translates as the 'Low-land' and the 'Upland', along with distributions to members of Sitnebsekhtu's household. Barley is measured in khar, and flax in bundles. The term 'Upland' denotes land in an elevated location which requires

FIGURE 5

THE HEKANAKHTE PAPERS: ACCOUNT VIII

| | | | |
|---|---|---|---|
| 1. | Account of what is in the *rw*: | | |
| 2. | Consisting of northern barley | | 36.2(*khar*) .3(*khar*) in the measuring vessel |
| 3. | Flax | | 7000(bundles) |
| 4. | Upland: | barley | 20(*khar*) |
| 5. | Upland: | the house | 1000(bundles) |
| 6. | What Nefersebau brought | | 20(*khar*) |
| 7. | Ip's boat | | 30(*khar*) |
| 8. | 'Aḥa . . . .'s son(?) . . . . khered | | 30(*khar*) |
| 9. | His father | | 35(*khar*) |
| 10. | . . . . . . | | 5(*khar*) |
| 11. | The women . . . . (?) | | 20.1(*khar*) |
| 12. | The old man | | 10(*khar*) |
| 13. | The *ḥit*(?) | | 10(*khar*) |
| 14. | 'Ab-kau | | 10(*khar*) |
| 15. | 2007 *ncḫw*-bundles | | |
| 16. | Balance | 4000(bundles), 30(*khar*) | |
| 17. | Upland | 8(*khar*) | |
| 18. | *hꜣ*(?) | | |
| 19. | Another <account of what is> with Ḥuni (?), without his giving it. | | |
| vs. 1. | What is in Tjauwer. | | |

*Source*: James (1968).

artificial irrigation, hence its lower productivity compared to the 'Low-land'. Lines 6–14 name individual recipients of five men (including Nefersebau, the agent mentioned in Account VII) and three women (lines 7, 11 and 14). It is possible to account for the flax, and probably the barley, belonging to the 'Upland'. Line 3 shows 7,000 bundles of flax which equal the entries in lines 5, 15 and 16 (1,000 + 2,000 + 4,000).[6] The 'Upland' barely entries in lines 6–16 total 208 hekat (20 + 30 + 30 + 35 + 5 + 21 + 10 + 10 + 10 + 7 + 30). This total exactly equals the entry on line 4 (20 khar = 200 hekat) plus 8 hekat on line 17. Why the 'Low-land' barley was not distributed is not clear. What appears from the account is the clear separation of the barley of the 'Low-land', presumably of a higher quality, from that of the 'Upland'.

## ACCOUNTING FOR PRIVATE DEBT AND ITS COLLECTION

Letter III was sent from Hekanakhte to a formal official, the overseer of land Herunufe, hence the more humble way in which Hekanakhte describes himself in contrast to the authoritative tone used when writing to his agent Merisu. Hekanakhte was owed certain debts (hinted at in Letter I) by some individuals in Hutha'a, presumed to be close to or part of Perha'a, and the assumption is that

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[6] Goedicke (1984, p. 112) reads the 2,007 on line 15 as '2,000 (bundles) and 7 (measures)'. He also reads line 11 as '21' not '2.1'.

FIGURE 6

THE HEKANAKHTE PAPERS: LETTER III

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(1) The servant of the estate, the *ka*-servant Ḥeḳanakhte says to—: Your condition is like living a million times. May Arsaphes, Lord of Heracleopolis, and all the gods who are <in heaven and in earth> help you. (2) May Ptaḥ-south-of-his-wall cheer you with life greatly and with <good> old age. (3) May your repute be good with the *ka* of Arsaphes, Lord of Heracleopolis.

This servant says: Let your scribe (l.p.h.) know (4) that (I) have sent Ḥeti's son Nakhte and Sinebnut about the barley and emmer which are there (where you are). Now what your scribe (l.p.h.) should do is to have (it) collected without letting (5) any of it be mixed up, in accordance with all your excellence, if you please. Now after it is collected (it) shall be placed in the house of your scribe (l.p.h.) until somebody comes about it. Now see! (6) I have got them to bring the corn-measure in which it is to be measured; it is decked with black hide. Now see! 15 *khar* of emmer are in Ḥut-ha'a (7) with Neneksu and 13 *khar* 5 *ḥeḳat* (?) of barley with Ipi the Younger in Iu-sobku. What is in Sepat-mat with Neḥri's son Ipi: 20 *khar* of emmer (8) <with> his brother Desher, 3 *khar*. Total: 38 *khar* (emmer), 13 *khar* 5 *ḥeḳat* (?) (barley). Now he who will give me the equivalent in oil shall give me one *hebnet*-measure for 2 *khar* of barley or for 3 *khar* of emmer. (*vs.* 1) But see! I prefer to be given my property in barley.

And let there be no neglect about Nakhte (i.e.) about anything about which he will come to you. See! (*vs.* 2) it is he who looks after all my property.

(*vs.* 3) The overseer of the Delta, Hrunufe.

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*Source*: James (1962).

Herunufe, in his official capacity, would oversee the collection of these debts as an impartial third party. The participation of this official, as someone who would mediate if required between the two parties to the debt, and who would see the conclusion of debt payment endows the process with legitimacy. Goedicke (1984, p. 77) also suggests that the presence of Herunufe signals that 'the property of the debtor served as security against defaulting', given Herunufe's title as overseer of land. Hekanakhte had to pay Herunufe a fee which is not specified, but rather stated to be the customary fee that is 'usually given'.

The debt to be collected is defined by name of debtor and by type of good, so that a clear distinction is made between barley and emmer as one khar of each commanded a different value (one khar of barley = 1.5 khar of emmer). The debt to be collected totals 38 khar of emmer and 13 khar 5 hekat of barley. But the letter reveals other interesting implications relating to the extent to which the grain should be measured and how different commodities could be equated with each other using a common denominator in the form of money of account.

First, Hekanakhte specifies a particular measure that had to be used when collecting his debt: 'I have got them to bring the corn measure by which it is to be measured; it is decked with black hide'. In the absence of coinage or weight, a volume measure had to be specified and used both when the debt is issued and when it is settled to observe reciprocity between debtor and creditor. Second, although Hekanakhte prefers that his debt is settled in barley, he is prepared to accept payment in kind in another form, namely oil. To ensure reciprocity, equivalent values are established to allow payment in oil: one hebnet of oil is construed to be equivalent to two khar of barley and three khar of emmer. This conversion system maintains the harmony of equivalence between barley and emmer of 3:2;

FIGURE 7

THE HEKANAKHTE PAPERS: ACCOUNT VI

| | | |
|---|---|---|
| (1) What is in Ḥutha'a—northern: | | |
| (2) With Sebeknedjem's son Nenrenef | 15 | (*khar*) |
| (3) And his brother | | |
| (4) What is in Sununisobku | | |
| (5) With Ipi the Younger | 9 | " |
| (6) What is in Sepat-mat | | |
| (7) With Neḥri's son Ipi | 20 | " |
| (8) What is in Set-sema(?) | | |
| (9) With Sisobk | 4 | " |
| (10) Sau | 3 | " |
| (11) The dog-keeper Ḥay | 2 | " |
| (12) Being what is to be measured in the big measure | | |
| (13) Which is in Nebesĕyet. | | |
| (14) Total thereof: | 52 | *khar* |
| (15) What is in the house of Khety-ʿankhef | 4.5 | (*khar*) barley |
| (16) Siti's son Si-Renenutet | 2 | " |
| (17) Seputy's son Nefer-Ḥatḥor | 1 | " |
| (18) Sikhentkheti's (son) ʿAnkhu | 6 | " |
| (19) (Total): | 13.5 | " |
| (20) Grand Total: | 117 | *khar* |
| *Verso* | | |
| (*vs.* 1) Account of what is in (*vs.* 2) Perha'a. | | |

*Source*: James (1962).

and hence quantities in oil, emmer and barley can be converted into additive values for the purposes of accounting for transactions and payment of debt. Accounting and money of account combine here to forge seemingly more precise measures of value and economic equivalence.

Account VI deals with the debts owed to Hekanakhte, and should be interpreted in conjunction with Letter III. Both James (1962, pp. 47, 64) and Baer (1963, p. 10) have suggested that this account was sent by Merisu to Hekanakhte in response to the request made by the latter at the end of Letter I, but this is difficult to reconcile with the fact that the Hekanakhte Papers never reached their ultimate destination, unless they were exchanged at least once before their final journey. There is one disagreement in the reading of the entry on line 11 relating to the dog-keeper Hay. Goedicke (1984, p. 89) reads the amount as 10 khar, whereas James (1962, p. 63) reads it as 2 khar; both readings indicating some uncertainty about the clarity of the original Hieratic. Attempts have been made to reconcile the figures in Letter III and Account VI, while bearing in mind that Account VI has more entries than those listed in Letter III. We may observe that apart from the additional entries in Account VI and the 3 hekat entry relating to Desher, entries in Account VI correspond to those in Letter III. James (1963, p. 64) surmises that the corn measure used, which is not specified in the account, for the entries in lines 1–11 must have been a double measure with a capacity of 20 khar.

Goedicke argues that the entry on line 11 relating to the dog-keeper Hay is to be treated separately, leaving a total of 51 hekat which is written as a sub-total of 52 hekat in Hieratic.[7] If a double-hekat measure was used, then 52 × 2 = 104 + 13.5 (total on line 19) = 117.5 hekat which is very close to the grand total of 117 hekat recorded at the end of the account. James (1962, p. 64) states rather patronisingly that such a discrepancy of half a khar only is 'a negligible error for an Egyptian scribe'. While James may be correct, whenever faced with some figures that he could not reconcile he has a tendency, as Baer (1963, p. 11, note 74) suggests, 'to assume that the scribe could not calculate correctly' (see James, pp. 23, 57, 114).

Baer (1963, pp. 10–11) has offered a simpler way of reconciling Letter III and Account VI by treating both as separate but complementary documents. In this case, the grand total of 117 hekat is the straightforward sum shown below:

Entries in Letter III: 38 khar emmer + 13.5 khar barley = 51.5 khar

Entries in Account VI:
(lines 2–10): 15 + 9 + 20 + 4 + 4 = 52 khar
+ (lines 15–18): 4.5 + 2 + 1 + 6 = 13.5 khar = 65.5 khar

Total: 117 khar

What is intriguing about these efforts to reconcile the numbers is the obsession with getting the figures right, whilst paying much less attention to the economic or social significance of the entries. Both attempts to reconcile the figures make assumptions which are either not attested by the documents themselves, such as the double-hekat measure or the failure of the scribe to add up in the case of James, or that the two documents are separate yet complementary in the case of Baer.

Taking the total debt owed to Hekanakhte to be 117 khar, and making the necessary adjustment to reflect the difference in the value of barley compared to emmer (a ratio of 3:2) we can calculate the total debt using emmer as a common denominator to equal 130.5 khar (which also equals 87 khar of barley): 90 khar of emmer and the equivalent of 40.5 khar (27 khar of barley converted into emmer equivalent using the 3:2 ratio). Baer (1963, p. 11) calculates that this amount at the time of Hekanakhte would have been sufficient to rent only 17.4 arouras of the 20 desired, leaving a remainder of 2.6 arouras to be paid for by other means such as the cloth. If the cloth was indeed valued at 24 copper debens as Hekanakhte had hoped (see Letter II), Baer calculates that this sum of money would have sufficed to buy 230.4 hekat of emmer in the eighteenth dynasty (the New Kingdom) which is equivalent to 9.6 hekat per every deben of copper. To reflect the higher prices during the Middle Kingdom Baer scales the quantity down by two-thirds indicating that one copper deben would have only bought 6.4 khar of emmer. This means that 24 deben of copper would have bought 154 hekat of emmer, or paid for the rent of approximately 5 arouras.[8]

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[7] Goedicke (1984, p. 88) has noted that the entry in line 10 (Sau/Zau) is not perfectly legible and could be read as 4 hekat, which means that all the figures in lines 1–10 would add up to the 52 hekat stated as a sub-total (this assumes away the entry on line 11 as Goedicke suggested).

## HEKANAKHTE'S WEALTH: A RECONSTRUCTION

The major difference between the economic activities of the estates of Hekanakhte and Sitnebsekhtu is the production of yarn on an apparently commercial scale in Sitnebsekhtu's estate (see Account VII). In this section, the economic and social status of Hekanahkte is assessed with the implications drawn being extendable to the estate of Sitnebsekhtu. The entry relating to the amount of land owned by Hekanakhte has been damaged, so only rented land can be calculated. Below are four alternative calculations of land rented by Hekanakhte in year 8 measured in arouras:

| Letter/account | James | Baer | Goedicke | Wente |
|---|---|---|---|---|
| I: Near Perha'a (line 7) | 10 | 30? | 10 | 10 |
| Rented | 7.5 | 13 | 13 | 13 |
| II: From Khentykhe (line 33) | 10 | 20 | 10 | 10 |
| From Hau the Younger Near Perha'a (line vs 2) | 5 | 20 | 20 | 20 |
| V: Under flax (line 16) | 1 | 1 | 1 | 1 |
| Total arouras | 33.5 | 84? | 54 | 54 |

In my view, Baer's readings are an overcalculation based on figures belonging to the Old Kingdom, whereas those of James are over conservative. Baer (1963, pp. 11–12) bases his reasoning on workloads indicated in Papyrus Bologna which specify a load of 200 khar (20 arouras) for one (probably non-free) man and half that for a boy. He calculates a maximum of 100 arouras of land that could have been cultivated by Hekanakhte's household on the basis of four men (Nakhte, Merisu, Sihathor and Sinebnut), and two boys (Anup and Snofru). But these calculations are troublesome because Baer assumes that members of Hekanakhte's household were treated as slave labour; an assumption that runs counter to Hekanakhte's care for his family and his preference to provision them with barley rather than the less desirable emmer. Based on a number of records, it is credible to suggest the following figures for one aroura of cultivated land (see James, 1962; Baer, 1963):

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[8] Baer's calculation is based on Papyrus Bulaq 12 which shows a price of 16 hekat as 1/60 deben of silver. Silver was valued at 100 times the price of copper. Converting 24 deben copper into silver gives 0.24 deben silver multiplied by 16 hekat and divided by 1/60 gives 230.4 hekat of emmer for 24 deben copper.

| | | |
|---|---|---|
| Purchase price: | 20 | khar |
| Crop | 15 | khar |
| Rent cost: | 5 | khar |
| Seed for cultivation: | 1.5 | khar |
| Taxes (only on owned land and calculated by Baer to be about one-tenth of the crop) | 1.5 | khar |
| Cost of labour | 4 | khar |

This leads to the following calculations of 'net income' per one aroura:

Owned with own labour: 15 – (1.5 seed + 1.5 tax) = 12 khar
Owned with hired labour: 15 – (1.5 seed + 1.5 tax + 4 labour) = 8 khar
Rented with own labour: 15 – (1.5 seed + 5 rent) = 8.5 khar
Rented with hired labour: 15 – (1.5 seed + 5 rent + 4 labour) = 4.5 khar
Letting own land: 5 – 1.5 tax = 3.5 khar

Absent from these calculations are any allowances for other transactions costs which could arise because either the cultivated land was too far away (transportation costs) or a large number of labourers had to be employed (supervisory and administrative costs). If the land were located in a close geographical proximity to the farmer renting it, and assuming that it was cultivated by a small number of men, the above calculations would suggest that the most profitable alternative was to own land and work on it. The second most profitable alternative would have been to rent land and work on it. Given a price of 20 khar for one aroura, and a net difference in crop in favour of owning compared to renting (3.5 khar), it would take only five years and seven months for that difference to pay fully for the price of the land. Assuming a calculating mentality (which may not be warranted), the question of buying and cultivating land, or renting it for cultivation, would have depended upon the amount of capital available.

It is in this context that the calculations made by Baer in comparing these two alternatives should be interpreted. Assuming that a farmer has only 20 khar he could either buy and cultivate one aroura to earn 12 khar per annum, or rent 4 arouras and earn 34 (8.5 × 4) khar per annum. On this basis Baer (1963, p. 15) argues that '[r]enting thus was far more profitable than buying as long as the total area was one that could be handled largely by the family'. But this calculation is incomplete because it does not take into account the value of the land owned which would be fully paid for in just over five and a half years.

These approximate calculations shed further light on the interpretation of the Hekanakhte Papers. In Letter I, vs 9–11 Merisu was instructed by Hekanakhte to cultivate the land he owns rather than allowing anyone else to rent it. This insistence on cultivating own land can be explained in terms of the higher yield of 12 khar compared to the 3.5 khar if the land was let. A second question concerns why Hekanakhte was interested in renting so much land, say 54 arouras taking the readings of Goedicke and Wente as an example. On the basis of the above calculation of average return of rented land worked by own labour, this amount of rented land would produce 459 (54 × 8.5) khar, which is a substantial quantity given that Hekanakhte also owned land which was cultivated with barley.

Perhaps it would be more useful to interpret these figures in the light of the needs of Hekanakhte's household. Letter II provides sufficient detail to calculate the provisions needed by Hekanakhte's family in situations of crisis, such as the high inundation reported in that letter. The aggregate total of monthly provisions for the household, including Hekanakhte, comes to 7.75 khar measures of barley. For a bad year, a minimum of 93 khar measures of barley were needed, and for a normal year, twice as much (186 khar measures) would have been expected. Compared to his family's needs, Hekanakhte's farming activities were fairly substantial. He had sufficient reserves to pay for land rental in advance (using the cloth, oil, and grain; see Letter I), was owed substantial amounts of debt (Letter III, Account V, Account VI) and owned other goods such as bulls, copper, oil and woven cloth. Hekanakhte was also the ka-servant (priest) for the dead vizier Ipi, a position of some prestige.

The above analysis leads to yet another question: Given the substantial capital reserves owned by Hekanakhte and the higher yield of owned land compared to rented land, why did he not buy more land instead of renting? This is particularly perplexing given that the price of land was fairly low in the Middle Kingdom (Baer, 1962). One possibility that Baer (1963, p. 12) raises is that the rate of interest at the time was higher than the return to be obtained from investing in land. However, he quickly abandons this possibility on the grounds that return from interest (with the associated risk of default) would have been only slightly greater than return from cultivating own land.

Another potential explanation is the lack of available land to buy at that time; either due to imposed restrictions or lack of normal supply because ownership of the majority of land might have been concentrated in the hands of few, influential families (see Baer, 1962). This latter point seems to be borne out for the Old Kingdom, but evidence suggests the break-up of some of these large holdings into much smaller holdings throughout the First Intermediate Period and early Middle Kingdom. In which case, Hekanakhte should have had little difficulty in buying land given the apparent ease with which he could rent land of a high quality even in a year of high inundation. Baer (1963, p. 14) attempts to explain this apparent paradox by suggesting that 'Hekanakhte's' reasons are likely to have been economic' on the grounds of his argument (referred to earlier) that '[r]enting was far more profitable than buying' (p. 15). He reiterates this point more fully by suggesting that '[a]s far as acquisition of additional land was concerned, the circumstances of his [Hekanakhte] time favored land ownership only on the part of those who did not intend to farm in person, largely officials, while renting was more advantageous to a farmer with moderate means' (p. 15). But given the availability of capital, it would be economically more rewarding to buy than to rent land. So, if profitability was Hekanakhte's only concern, I fail to see why he did not buy land, unless if it was not available. It is just possible that economic-based concern with profitability of the degree implied by Baer was not the only, or indeed the main, driver of this preference for rented rather than owned land.

### *Beyond Economic Reason?*

Many of the above arguments have attributed some notion of economic 'rationality' to the decisions and actions taken by Hekanakhte. Yet, while economic explanations can be shown to be consistent with some of Hekanakhte's decisions, this does not necessarily imply that economic rationality was the real driver. A measure of reflexivity is required to admit the possibility of other explanations that go beyond purely economic reason. The danger of insisting on an economic explanation is evidenced in some of Baer's remarks about Hekanakhte as a person. For example, in commenting on why Hekanakhte admonished Merisu for sending him old barley while keeping new barley for himself (Letter I, vs. 1–2) Baer states 'If Merisu's motive had merely been to economize, Hekanakhte would not have objected—but only for economizing on his father's food but not his own' (1963, p. 17). Yet, no hint is given of the evidence on the basis of which Baer makes this assertion. Similarly, Baer (p. 17) curiously understands the decision by Hekanakhte to reduce Nakhte's rations (Letter I, line 17) as one of profiteering at the expense of his own household 'Instructions tacitly to cut the wages of Heti's son Nakht[e] suggest that profit was more important than honesty in that household'. Again, the documents offer no support for this sweeping statement. In making his point about Hekanakhte's 'undesirable' personality, Baer (p. 17) claims:

> And however one would like to suppose that Hekanakht[e] used some of his resources to succour the poor and starving among his neighbors, charity is not likely to have been a significant element in the personality of a man who was capable of putting his family on short rations for profit. Hekanakht[e] was a miser, and possibly we need not look beyond the thought of all those sacks of grain and bales of linen waiting to be admired to explain his economic practices.

All these charges are made because Baer cannot see how Hekanakhte's actions square the circle of economic reason. Yet, later on, Baer (p. 17) considers one possibility, that of preparing for death: 'It is not unreasonable to suggest that the Egyptian of moderate means followed Hekanakht[e]'s example of keeping his funds liquid rather than investing them in land, and that mortuary expenditures will have played as dominant a role in the private economy of Egypt as they did at some periods in the public.' I contend this is a more compelling explanation of Hekanakhte's actions, but unfortunately Baer does not develop it, presumably because he has already made up his mind about Hekanakhte's prime profit motives and misely personality.

Given the importance of preparing for the afterlife it would not be too much to assume that one of the main reasons for Hekanakhte accumulating such capital was to prepare for his own burial and tomb service. As someone with religious duties himself, it is not unrealistic to expect him to have had strong beliefs in the afterlife. Further, as someone who held a respectable occupation and as a reasonably well-off farmer, he may have wanted his preparation for the afterlife to be consistent with his social and economic standing. Preparing for a good burial was one of two aspirations an ancient Egyptian held; the other aspiration was having a house. Thus, in the Instructions of Prince Hardjedef to his son Au-ib-re he says (Lichtheim, 1975, p. 58):

> When you prosper, found your household,
> Take a hearty wife, a son will be born to you.
> It is for the son you build a house,
> When you make a place for yourself.
> Make good your dwelling in the graveyard,
> Make worthy your station in the West.

Moreover, there is strong evidence of non-royal burials in Coffin Texts of the Middle Kingdom, a practice not known in the Old Kingdom. This change has been attributed to 'the private person's desire to claim identity with Osiris (god of the Underworld) after death, rather than an attempt to usurp the privileges of the living Kings' (Bourriau, 1991, p. 4). This trend of burial customs for more common people continued so that by the late XII–XIII Dynasties, Bourriau (p. 15) suggests 'Opportunities for the burial and/or commemoration in a sanctified place close to a royal mortuary temple, or at Abydos at the "Terrace of the Great God", were open to more people than ever before'. There is no primary Middle Kingdom source from which the cost of burial and tomb maintenance can be calculated. However, there is sufficient evidence from the New Kingdom to offer a glimpse of how extremely costly these items were. The calculations below are based on Janssen (1975, pp. 209–48). Burials involved the preparation of four types of coffin: a sarcophagus (db't); an outermost anthropoid coffin (mn-'nh); an anthropoid coffin (wt); and an innermost coffin (swht). The range of the aggregate cost of all four coffins was between 80 and 376 copper deben. A copy of the Book of the Dead cost between 60 and 100 copper deben. Additional tomb equipment (jars, shrines, beds, statues, etc.) cost between 40 and 68 copper deben. In total, the cost of all these items ranged between 180 and 544 copper deben. By way of example, if Hekanakhte planned to spend only 250 copper deben on all these items, this sum can be converted into the equivalent of 125 khar of barley, assuming an exchange rate of one khar equals 2 deben of copper (Cerny, 1954; Janssen, 1975, pp. 122–5). Expensive as it may seem, this is only a small fraction of the total cost of burial and tomb maintenance. For these calculations do not include a number of very expensive items. First, the cost of building and decorating a tomb (typically more elaborately and durably built than a normal house, Baer, 1963, p. 17). Second, the cost of mummifying the body which normally took up to forty days. Third, the cost of paying a ka-servant to attend to religious ceremonies for many years after death, unless this function was performed by Hekanakhte's family. Even using the most optimistic calculations of Hekanakhte's wealth at the time the accounts and letters were written, he still would have needed to accumulate more capital to prepare adequately for death.

## CONCLUSIONS AND IMPLICATIONS

Based on his analysis of the Hekanakhte Papers, James (1962, p. 11) has suggested:

> It may be possible to reconstruct the organization of a small estate in upper Egypt in the early Middle Kingdom along the following lines. At the centre was the main household with lands attached, worked by the owner of the estate helped by various persons. These

> persons, attached to the main household or 'home-farm' for purposes of living and general organization, might in addition be granted small plots of land which they could work on their account, no doubt paying something in the way of rent to the proprietor of the estate. The work of such people would therefore be partly private and partly communal and in the absence of the proprietor it would be a simple matter to transfer the responsibility for running the whole estate on to their shoulders.

That such a fascinating picture can be assembled from ancient records is a testimony to the power of writing. For through inscribed ancient documents we can patiently, but also meticulously, piece together a rich tapestry of human life. Yet surprisingly, there is no reference in the above quote to the power of accounting in rendering this household economy possible, barring the incidental and rather distant reference to the persons being given small plots of land to 'work on their *account*'. This lack of direct reference to accounting is particularly curious, given that the Hekanakhte Papers are nothing but a collection of accounts and business letters. The above analysis suggests that without the intervention of accounting, the economic and social organization of the Hekanakhte estate would not have been possible.

Accounting calculations made it possible for the owner, Hekanakhte, to quantify in more precise terms the levels of his wealth, the annual outcome of land cultivated in his name, either owned or rented, and the debts collected and those that remained outstanding. He could plan to extend his agricultural activities, by specifying precisely how much additional land can be rented for cultivation by his dependants, at what price, and how this would be paid for. He could also specify targets of output from his cultivated land that he expected, indeed demanded, to be delivered during harvest time. An overall appreciation of his wealth, his annual produce, and the overall state of the economic climate would also allow Hekanakhte to fix rations for his dependants as he saw fit; hence the large difference in the rations he allowed himself and his dependants during normal times compared to the high inundation time. But even within the same general economic setting, having access to precise ways of quantification allowed Hekanakhte to differentiate between the rations of different members of his household, so that he can be 'generous' to a measure when allocating provisions to his mother or his favourite sons compared to other members.

Similarly, the allocation of small plots of land to the persons attached to Hekanakhte's 'home-farm' would have been underpinned by calculations that took account of the capacity of each individual for cultivation, the precise rent that had to be levied in return for this privilege, and the timing of the rent delivery. Moreover, the drawing of the boundary between the amount of work to be performed by each of these persons as part of the communal domain compared to the private domain seems to have been invested in awareness not only of the work capacity of every individual (which might have been standardized across able men) but also of the 'appropriate' balance that had to be observed between the private and communal domains. Finally, accounting calculations across time and space made it possible for Hekanakhte to monitor the affairs of his estate and his household from a distance. Responsibilities were assigned precisely to those agents entrusted to act on his behalf during his absence, and the discharging of responsibilities was recorded in the accounts for future monitoring. If accounting has been credited with underpinning all these important roles in the economic and social spheres of family life and private estates, it is relevant to comment on the technical apparatus used to facilitate the fulfilment of these roles.

### *Techniques of Measurement/Valuation*

Accounting calculations in the Hekanakhte Papers employed different measurement units in different contexts. Entities of reasonably homogeneous types, for example, bundles of flax, loaves of bread, number of bulls, were simply counted. These counting entities carried implicit values in themselves through which equivalence *within* a given type of good could be observed, so that two loaves of a particular type of bread could be considered of equivalent value. By standardizing an economic good (a specific type of bread) for which counting was deemed to be an appropriate measurement system, the internal coherence of the valuing system was preserved.

But such internal coherence of the system of equivalence would be seriously disrupted if there were a scope for significant variations within the same type of good to occur, for example, the weight/size of bread loaves or the quality of bread loaves of the same weight. In such cases, other restrictions are needed if some notion of strict economic equivalence is to be observed. While the evidence from the Hekanakhte Papers is lacking on how such potential variations may have been dealt with, some relevant inferences could be made. For example, flax was measured using bundles as a denominator; it is possible that some weight/size limits were stipulated for the standard bundle. Equally, when loaves of bread or numbers of particular types of cakes were used to quantify targets or output, agreed measures of weight and quality are likely to have been stipulated, as evidenced from the bakery accounts of Seti I in the New Kingdom (Spalinger, 1986; Ezzamel, 1997). Hence, rather than assume that basic counting was a crude way of quantifying an even cruder notion of value, I contend that this counting system was typically underpinned by more stringent qualifications on weight and quality that endowed it with greater precision. Such counting measures were suitable to situations of constructing an inventory list of the various farm assets or produce purely for internal purposes. Their main limitation, however, was that they could not translate across different types of commodity, for example, bulls and loaves of bread, without the intervention of another measure of equivalence that could act as a common denominator of a wider application. With such a common denominator, these same objects could command a more 'precise' valuation should there be need to exchange them with people outside the household. Thus, had Hekanakhte required the sale of some of his bulls, bread, or flax, some other denominator such as copper deben would have been used, just as was the case with the cloth that was to be used to pay for land rental (Letters I and II).

The second group of denominators used in the Hekanakhte Papers were those that reflected capacity measures or inherent value in the most direct manner. Capacity measures used related to grain, whether emmer or barley, which were always quantified in khar and hekat. These capacity measures were used by

Hekanakhte to: (a) fix precise rations for members of his household (Letter II; Account V); (b) quantify the debt owed to him by various people (Letter III; Account V); (c) represent the cost of renting one aroura of land (Letter I); and (d) determine the target output of barley per aroura that his agents were to be held responsible for. Within the same capacity measure, different values could be determined for different commodities; two khar of barley were fixed as equivalent to three khar of emmer. Like all types of money, for these monies of account to have relevance beyond those directly involved in an economic transaction they had to be underpinned by wide acceptance within society (see Simmel, 1978; Block and Parry, 1989).

However, even though these capacity measures had wider applicability across commodities, in the sense that they could be translated into other equivalent monies of account, there was recognition that variations in value could occur if alternative capacity measures were used. This possible variation would have occurred because of the difference between the theoretical measure of capacity and the physical measure. The theoretical measure was fixed, invariable across time and space in the Middle Kingdom. In practice, however, it appears that the physical measures could vary, even if marginally, either because of minor unintended inaccuracies when making them or because it may have been advantageous to have two different physical measures of the same theoretical capacity. This latter possibility would allow for one person to use the larger physical measure when collecting grain, and the smaller measure when paying or issuing grain, but such possibility assumes asymmetric knowledge about differences in physical capacity measures.[9] In the absence of a physical capacity measure of the khar or hekat that was fixed and accepted throughout Egypt, Hekanakhte insisted that his own capacity measure was to be used when collecting the debt owed to him (Letter III), possibly because this was the same measure he used when he issued the grain to his debtors, or because he saw some advantage in using it.

In the deben and khar there are two different types of money of account linked together through an internal system of precise equivalence which permits their inter-translatability. Hence, a commodity initially valued in khar could be easily translated into an equivalent value stated in deben, and vice versa, using the conversion ratio of one khar of barley being equivalent to two copper deben. This ability to translate across different monies of account introduced greater flexibility in exchange relations. One example is the use of the cloth, once an agreed value in copper deben was placed on it, for the rent of land (Letters I and II). Another example is Hekanakhte's willingness to accept payment of debt owed to him in hebnet of oil, where he fixes its value to be one hebnet equivalent to two khar of barley and three khar of emmer (Letter III). The fact that Hekanakhte here fixes these money exchange values may suggest that he set a favourable price for himself, given his stated preference to be paid in barley, but this is beside the point. The important point to note is that this ability to translate across different monies of account broadens the scope of exchange considerably by permitting the use of different monies.

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[9] An interesting parallel comes from the nineteenth-century AD when grain elevator operators in Chicago were able to mix high-grade and low-grade grain to enhance the overall average grade at which they could sell the grain, while paying farmers lower prices based on grading their grain as low-grade (Cronon, 1991, pp. 132–5). I am grateful to one of the reviewers for bringing this point to my attention.

When used to fix rations for members of the household, accounting does not only construct the fortunes of these individuals, in terms of how little or how much access they have to resources. It also unequivocally establishes a particular social pecking order. Thus, the qualitative respect in which Hekanakhte holds his mother is translated into a precise differential in the provisions allocated to her (Letter II), and hence the emotional words with which he greets her at the beginning of the letter are converted into a more measurable quantity. Further, even when dealing with concrete commodities, such as emmer or barley, the valuation imposed upon them through accounting endows them with an abstract, theoretical value that makes them amenable to finer degrees of human intervention. Parts of a commodity could now be exchanged for parts of other commodities with equivalent value that is more precisely denominated than a more *ad hoc* social exchange that does not compare like with like. Payments for loaned commodities could be accepted in other commodities (or monies of account) provided that the exchange price is agreed by the creditor, and so on. The scope for further possibilities became only limited by human imagination.

### *Method of Reporting*

It is in situations where activities are less observable that the intervention of accounting has been given considerable stress in the literature. For Hekanakhte as the absent landlord at some considerable distance from his estate, accounting practices offered him an indispensable tool through which he can manage his estate. The Hekanakhte Accounts can be thought of as early examples of the use of accounting to construct a form of human accountability, which while it should be distinguished from modern notions of accountability, could nonetheless be used to hold others to account. Each account specified precise dates, locations of individuals and activities to be accounted for, and details of individuals who were the locus of accountability. In this sense, each account was a time–space ordering device of some sort, which is not necessarily compatible with time–space ordering in modernity (Giddens, 1991). Such detailed listing of places, dates and individuals, coupled with precise instructions and targets specified in quantitative terms, would have meant that more strict measures of accountability could be established and acted upon compared to situations where the temporal and spatial specifications are absent.

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# An Application of Data Envelopment Analysis to the Evaluation of Audit Risk

This article demonstrates how data envelopment analysis can be used to weight audit risk factors. Data from a previously reported study applying the analytic hierarchy process is used to facilitate a comparison between these two methods. Data envelopment analysis (DEA) has several advantages, including the ability to accommodate a range of expert opinions on the importance of a specific risk factor, rather than using the median or mean value. DEA can be used to provide high-risk and low-risk assessments and provides benchmark audit units from which other units can be evaluated.

**Key words:** Analytic hierarchy process; Audit risk, Data envelopment analysis.

Data envelopment analysis (DEA) is a linear programming-based technique that converts multiple input and output measures into a single comprehensive measure of productive efficiency (Charnes *et al.*, 1978). As part of its evaluation of the efficiency of decision-making units, DEA identifies a frontier of 'best-in-class' units that are used to measure the relative efficiency of remaining units in terms of their distance from that frontier. Charnes and Cooper (1980) extended the DEA technique to include 'comprehensive audits', which embodied broad accountability notions of efficiency and effectiveness.

Sherman (1984) describes how DEA can be used as an internal audit tool for 'managerial' or 'operational audits'. DEA has been used in evaluating 'performance audits' (Anderson *et al.*, 1994); for measuring branch office efficiency (Metzger, 1994); and as an aid to auditing workers compensation benefits (Bergquist, 1996). While often referred to as 'audits', the focus of these studies has been on measuring relative efficiency of operating performance. The use of DEA in a financial audit setting has not been addressed in prior literature.

This article focuses on the use of DEA to assess audit risk. AU 312 (SAS No. 47 [AICPA, 1983]) requires the auditor to consider audit risk when planning and

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designing audit procedures. It also states that audit risk may be assessed in quantitative and non-quantitative terms. However, given the increasing risk orientation of auditing (see Cushing *et al.*, 1995; Bell *et al.*, 1997) quantitative methods of risk assessment, as an audit tool, are likely to increase in importance.

The use of DEA to measure audit risk, as opposed to operational efficiency (e.g., see Worthington, 2000), is the main contribution of this article. Specifically, we (a) illustrate its application in a new area, and (b) demonstrate its flexibility in terms of alternative frontier orientations and weight flexibility. To illustrate the use of DEA to measure audit risk we apply data reported in a previous case study. We compare two quantitative methods of risk assessment: (a) analytic hierarchy process (AHP), and (b) DEA. We also describe the benefits of using DEA to identify audit risk and the additional benchmarking insights that can be obtained from standard DEA output results.

## AUDIT RISK MODEL FOR AUDIT PLANNING

The assessment of audit risk is an essential part of the audit planning process (Institute of Internal Auditors, 1978; SAS No. 47). The objective of an audit risk approach is to assess the risk of business units (or financial statement items), which is then used as a basis for audit planning. Quantitative approaches take audit judgments as inputs and apply algorithms to produce a numerical risk score for each audit unit. The risk score index is then used, together with materiality, as the basis for the allocation of discretionary audit resources. The assumption underlying the development of such an index is that there is a positive relation between the assessed risk score and the potential loss from each audit unit that will occur if it is not subjected to an audit or if the audit has not been adequate. Figure 1 shows a general outline of this approach. This is also consistent with recent audit methodology such as business measurement process (BMP). The BMP auditor is required to identify significant process business risks and how they are monitored and controlled (see Bell *et al.*, 1997, p. 35).

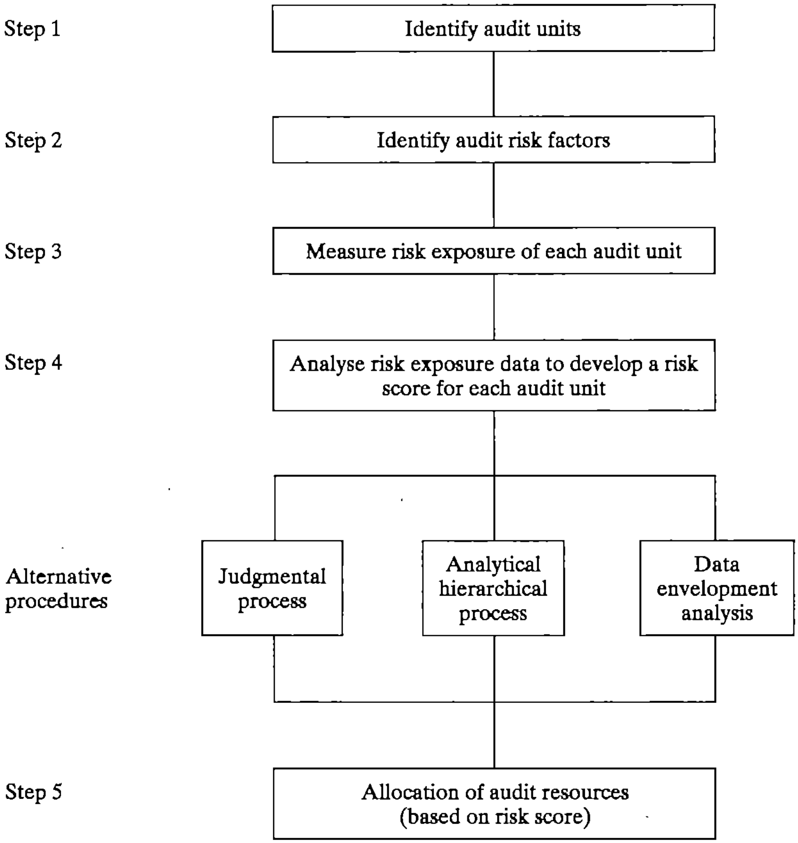
The audit risk approach to allocating audit resources begins by classifying the organization into audit units, according to either the unit's business function or geographic location. Kanter *et al.* (1990) describe the identification of audit units as one of the most difficult tasks in installing an audit risk approach.

Step two requires identification of appropriate risk factors. Patton *et al.* (1982) compile a list of nineteen risk variables, but in practice the number is usually restricted to between five and ten (Kanter *et al.*, 1990). This reduction is feasible because risk factors that are constant across audit units will have no impact on the relative risk assessment of audit units. Kanter *et al.* suggest that there may be an inverse relation between the number of factors and the ability of the auditing team to make meaningful judgments.

Step three measures the risk exposure of each factor for each audit unit and step four assesses the audit data, scoring each audit unit on the basis of risk. This step can range from the application of mathematical techniques, such as the analytical

FIGURE 1

AUDIT RESOURCE ALLOCATION USING AN AUDIT RISK APPROACH


Step 1
Identify audit units
Step 2
Identify audit risk factors
Step 3
Measure risk exposure of each audit unit
Step 4
Analyse risk exposure data to develop a risk score for each audit unit
Alternative procedures
Judgmental process
Analytical hierarchical process
Data envelopment analysis
Step 5
Allocation of audit resources (based on risk score)

hierarchical process (AHP) or data envelopment analysis (DEA), to a simple aggregation of audit factors based on judgment.[1]

The final step is to allocate audit resources on the basis of the risk scores. This involves three decisions. First, assessing the materiality in relation to the risk of each business unit. Second, budgeting the time and resources to be allocated to audit units (e.g., Patton *et al.*, 1982; Siers and Blyskal, 1987; Anderson and Young, 1988). Third, establishing the timing of the interval for cyclical audits (e.g., Wilson and Ranson, 1971; Hughes, 1977; Boritz and Broca, 1986; Bensen and Knechel, 1991).

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[1] See Boritz (1983) for a detailed discussion of various methods of ranking audit units, and Boritz and Jensen (1985) for a discussion of the advantages and disadvantages. Neither of these articles discuss the use of DEA.

## THE JANSSEN PHARMACEUTICA CASE STUDY

Miltz *et al.* (1991; hereafter MCW) describe the use of risk-based procedures to allocate audit resources for the Janssen Pharmaceütica group of companies, using the analytic hierarchy process. We show how DEA fits in with the general audit risk approach and where it diverges from AHP as applied by Miltz *et al.* This case study incorporates most of the features of the audit risk model described in Figure 1. A risk index is developed using internal auditors' judgment of risk factors and their relative importance (weighting). Using a multiple-criteria, pairwise-weighting method, suggested by Patton *et al.* (1982) and Lin *et al.* (1984), a risk score is compiled for fifty-seven audit units. The total audit risk for an audit unit equals the weighted sum of the risk factors:

$$R_j = \sum W_i * F_{ji} \qquad (1)$$

and

$$\sum W_i = 1 \qquad (2)$$

where $R_j$ = total risk of audit unit $j$, where $j = 1, \ldots 57$,
$F_{ji}$ = value of risk factor $i$ for each audit unit $j$ and $i = 1, \ldots 6$,
$W_i$ = the importance (weight) for each risk factor.

To determine total audit risk ($R_j$), it is necessary to establish a set of factors ($F_i$) that reflect audit risk and which can be measured for all audit units in the sample. The ability to discriminate between audit factors is an important feature of the audit risk approach. Miltz *et al.* (1991) adopt the consensus view of five of Janssen's internal auditors to yield a set of six risk variables. We reproduce these in Table 1.

The relative weights ($W_i$) of each of the six risk factors are estimated using a pairwise comparison, based on the scaling methods introduced in Saaty (1977). Estimates of risk for each the six risk factors ($F_{ji}$) for each audit unit were obtained by assigning a scale ranging from 1 (lowest risk) to 5 (highest risk). The first seven columns of Table 2 report the estimated risk measures for each risk factor for each audit unit ($F_{ji}$).

The eighth column, labelled 'AHP total risk', contains the calculation of total risk ($R_j$) per audit unit using AHP and a uniform system of weights based on a consensus view. In order to obtain a composite weight for the risk factors, Miltz *et al.* (1991) adopted a median 'consensus'. For example, where the weights assigned by the internal auditor to the Size variable were 2.8, 5.7, 6.4, 16.3 and 37 per cent. Miltz *et al.* (1991) chose the median value of 6.4 per cent as the 'consensus' weighting for the size variable (hereafter referred to as the 'consensus auditor').

While this central tendency approach is supported by David (1988) and Barzilai *et al.* (1986), it does raise the issue of whether the risk factor weightings are representative when a consensus is estimated from only a small number of

TABLE 1

RISK FACTOR FROM THE (MILTZ *ET AL.*, 1991) AHP ANALYSIS

| Risk factor | Median | Lower value | Upper value |
|---|---|---|---|
| Size<br>Monetary importance and number of employees | 6.4% | 2.8% | 37.0% |
| Control<br>The quality of the unit's internal control structure, based on previous audit results and the commitment of the unit's management to maintain proper internal controls | 41.0% | 9.3% | 47.4% |
| Change<br>Changes in management and key personnel, business activity, organization, business systems, and external environment | 26.1% | 11.5% | 44.9% |
| Environment<br>Political risk, local business practices, and local legal, economical and cultural environment | 5.9% | 3.2% | 11.5% |
| Pressure<br>Internal pressure on management such as budgets and procedures and external pressure on management resulting from the operational performance and the general economic condition of the unit | 5.9% | 5.6% | 11.2% |
| Scope<br>Activities of the unit such as existence of production facilities, R&D, export, and the diversification of the product line | 14.8% | 5.6% | 35.3% |

experts.[2] A potentially serious drawback with using the median is that it ignores the distribution of weights provided by the expert panel.[3] Examination of the upper and lower values for the other factors contained in Table 1 suggests considerable variation among the experts' assessment of audit risk. Experts can differ in opinion due to their different experience and training. This is not necessarily an error; it merely reflects each expert's way of organizing information (Einhorn, 1974).[4] Accordingly, some flexibility may be required to reflect differing perceptions of risk. DEA can provide this flexibility fairly easily and in a controlled form.

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[2] Skewed distributions might also arise from risk factors that are ambiguous, as well as from small samples.

[3] Note in Table 1 that Environment and Pressure have the same median risk factor (5.9 per cent) but have different ranges. On the other hand, Control and Change have a similar lower and upper values but the median on Control is almost twice that of Change.

[4] Kanter *et al.* (1990) also report inconsistencies in audit manager's assessments of risk exposure. It is probable that some auditors overemphasize a variable (e.g., size) because it is a 'rule of thumb' surrogate for other types of audit risk. For example, there is a high correlation (0.79) between Size and Scope.

TABLE 2

COMPARISON BETWEEN AHP AND DEA RISK SCORES FOR EACH OF 57 AUDIT UNITS

This table reports the estimated risk measures for each risk factor for each audit unit ($F_{ji}$) and the total risk score ($R_j$) using AHP and DEA risk scores for high/low risk.

| Audit unit | Size 6% | Control 41% | Change 26% | Environment 6% | Pressure 6% | Scope 15% | AHP Total risk[a] | DEA[b] High-risk[c] | DEA[b] Low-risk[c] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4 | 5 | 4 | 4 | 2 | 5 | 4.44 | 1.00 | 0.45 |
| 2 | 5 | 5 | 4 | 2 | 2 | 5 | 4.38 | 1.00 | 0.45 |
| 3 | 4 | 5 | 4 | 4 | 2 | 2 | 3.99 | 0.92 | 0.48 |
| 4 | 4 | 5 | 3 | 4 | 2 | 3 | 3.88 | 0.92 | 0.51 |
| 5 | 3 | 5 | 4 | 3 | 2 | 2 | 3.87 | 0.90 | 0.51 |
| 6 | 3 | 5 | 3 | 2 | 2 | 4 | 3.85 | 0.89 | 0.54 |
| 7 | 3 | 5 | 4 | 2 | 2 | 2 | 3.81 | 0.88 | 0.53 |
| 8 | 3 | 4 | 4 | 3 | 2 | 4 | 3.76 | 0.91 | 0.58 |
| 9 | 2 | 5 | 4 | 3 | 2 | 1 | 3.66 | 0.74 | 0.57 |
| 10 | 2 | 5 | 3 | 1 | 2 | 2 | 3.43 | 0.75 | 0.79 |
| 11 | 1 | 4 | 4 | 4 | 2 | 2 | 3.40 | 0.81 | 0.76 |
| 12 | 1 | 5 | 3 | 4 | 1 | 1 | 3.34 | 0.60 | 0.69 |
| 13 | 1 | 4 | 4 | 4 | 2 | 1 | 3.25 | 0.67 | 0.79 |
| 14 | 4 | 3 | 4 | 2 | 2 | 3 | 3.20 | 0.87 | 0.67 |
| 15 | 2 | 4 | 3 | 3 | 2 | 2 | 3.14 | 0.74 | 0.80 |
| 16 | 4 | 2 | 5 | 3 | 2 | 3 | 3.11 | 0.90 | 0.47 |
| 17 | 2 | 4 | 3 | 4 | 2 | 1 | 3.05 | 0.65 | 0.85 |
| 18 | 4 | 3 | 3 | 1 | 2 | 4 | 3.03 | 0.77 | 0.73 |
| 19 | 2 | 3 | 3 | 3 | 2 | 4 | 3.03 | 0.76 | 0.79 |
| 20 | 5 | 1 | 5 | 2 | 2 | 5 | 3.00 | 0.69 | 0.45 |
| 21 | 5 | 1 | 5 | 2 | 1 | 5 | 2.94 | 0.62 | 0.45 |
| 22 | 2 | 3 | 3 | 4 | 2 | 1 | 2.64 | 0.62 | 0.90 |
| 23 | 3 | 2 | 2 | 5 | 2 | 4 | 2.54 | 0.70 | 0.78 |
| 24 | 1 | 3 | 2 | 5 | 2 | 2 | 2.53 | 0.61 | 0.89 |
| 25 | 1 | 3 | 2 | 5 | 2 | 2 | 2.53 | 0.61 | 0.89 |
| 26 | 1 | 3 | 3 | 3 | 2 | 1 | 2.52 | 0.55 | 0.96 |
| 27 | 1 | 3 | 3 | 3 | 2 | 1 | 2.52 | 0.55 | 0.96 |
| 28 | 1 | 3 | 2 | 4 | 2 | 2 | 2.47 | 0.60 | 0.94 |
| 29 | 1 | 3 | 2 | 4 | 2 | 2 | 2.47 | 0.60 | 0.94 |
| 30 | 1 | 3 | 2 | 4 | 2 | 2 | 2.47 | 0.60 | 0.94 |
| 31 | 3 | 2 | 3 | 2 | 2 | 3 | 2.47 | 0.67 | 0.87 |
| 32 | 1 | 3 | 2 | 4 | 2 | 2 | 2.47 | 0.60 | 0.94 |
| 33 | 1 | 3 | 3 | 2 | 2 | 1 | 2.46 | 0.53 | 0.99 |
| 34 | 1 | 3 | 3 | 2 | 2 | 1 | 2.46 | 0.53 | 0.99 |
| 35 | 1 | 3 | 3 | 2 | 2 | 1 | 2.46 | 0.53 | 0.99 |

TABLE 2

CONTINUED

| Audit unit | Size 6% | Control 41% | Change 26% | Environment 6% | Pressure 6% | Scope 15% | AHP Total risk[a] | DEA[b] High-risk[c] | DEA[b] Low-risk[c] |
|---|---|---|---|---|---|---|---|---|---|
| 36 | 2 | 3 | 2 | 5 | 2 | 1 | 2.44 | 0.63 | 0.85 |
| 37 | 1 | 3 | 2 | 3 | 2 | 2 | 2.41 | 0.58 | 0.96 |
| 38 | 1 | 3 | 2 | 3 | 2 | 2 | 2.41 | 0.58 | 0.96 |
| 39 | 1 | 3 | 2 | 3 | 2 | 2 | 2.41 | 0.58 | 0.96 |
| 40 | 1 | 3 | 2 | 3 | 2 | 2 | 2.41 | 0.58 | 0.96 |
| 41 | 1 | 3 | 2 | 3 | 2 | 2 | 2.41 | 0.58 | 0.96 |
| 42 | 3 | 2 | 2 | 5 | 2 | 3 | 2.39 | 0.66 | 0.81 |
| 43 | 1 | 3 | 2 | 5 | 2 | 1 | 2.38 | 0.53 | 0.94 |
| 44 | 1 | 3 | 2 | 5 | 2 | 1 | 2.38 | 0.53 | 0.94 |
| 45 | 3 | 2 | 3 | 1 | 1 | 3 | 2.35 | 0.56 | 0.91 |
| 46 | 4 | 1 | 4 | 1 | 2 | 3 | 2.32 | 0.50 | 0.88 |
| 47 | 1 | 3 | 2 | 4 | 2 | 1 | 2.32 | 0.52 | 1.00 |
| 48 | 1 | 3 | 2 | 4 | 2 | 1 | 2.32 | 0.52 | 0.98 |
| 49 | 1 | 3 | 2 | 3 | 2 | 1 | 2.26 | 0.49 | 1.00 |
| 50 | 1 | 3 | 2 | 3 | 2 | 1 | 2.26 | 0.49 | 1.00 |
| 51 | 1 | 3 | 2 | 3 | 2 | 1 | 2.26 | 0.49 | 1.00 |
| 52 | 2 | 2 | 3 | 2 | 2 | 2 | 2.26 | 0.62 | 0.91 |
| 53 | 5 | 1 | 2 | 3 | 3 | 4 | 2.19 | 0.55 | 0.86 |
| 54 | 2 | 2 | 2 | 2 | 2 | 3 | 2.15 | 0.56 | 0.94 |
| 55 | 2 | 2 | 2 | 3 | 2 | 2 | 2.06 | 0.56 | 0.95 |
| 56 | 2 | 1 | 2 | 1 | 3 | 4 | 1.89 | 0.40 | 1.00 |
| 57 | 2 | 2 | 1 | 2 | 1 | 2 | 1.68 | 0.39 | 1.00 |

[a] The Total risk column is the risk score assessed in Miltz *et al.* (1991).

[b] DEA refers to the audit risk scores from a DEA analysis.

[c] High-risk refers to the DEA analysis where efficiency is assessed as high audit risk. The Low-risk columns are where 'efficiency' is assessed as low audit risk.

## DEA METHODOLOGY

In general terms, DEA is an optimization method that searches for combinations of weights that optimize the risk (or efficiency) score of the particular unit being evaluated. Units that lie on the 'efficient' frontier are conventionally assigned a score of 1 (or 100 per cent); scores for units not on the frontier are less than 1. Proceeding with each unit in turn, the model searches for combinations of weights that will optimize each successive unit's score, subject to the constraint that the same weights will not lead to any other unit's score exceeding unity.[5]

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[5] This is for an input orientation. For an output orientation, scores must not be less than 1.

The typical use of DEA is to analyze the performance of units (e.g., bank branches, hospitals, schools) that produce similar outputs and consume similar inputs.[6] The typical DEA model uses multiple input and output variables to produce an efficiency score defined as:

$$\text{Efficiency score} = \frac{\text{weighted sum of outputs } (1, \ldots, s)}{\text{weighted sum of inputs } (1, \ldots, m)} \tag{3}$$

The more formal DEA (input-orientation) model is:

$$\max \quad z_o = \frac{y_o^T u}{x_o^T v} \tag{4}$$

$$\text{subject to} \quad \frac{\mathbf{Y}\,\mathbf{u}}{\mathbf{X}\,\mathbf{v}} \leq 1$$

$$\mathbf{u}, \mathbf{v} \geq 0$$

where $\mathbf{Y}$ $(n \times s)$ and $\mathbf{X}$ $(n \times m)$ are matrices containing $s$ outputs and $m$ inputs for $n$ units, $\mathbf{y}_o$ and $\mathbf{x}_o$ are vectors of outputs and inputs for the particular unit evaluated. The model searches for weights, $\mathbf{u}$ and $\mathbf{v}$, which maximize the efficiency score for a unit '*o*' subject to the constraint that these weights, when applied to the output–input ratios for all of the other units (1 to $n$) including unit '*o*', do not result in an efficiency score of greater than 1 for any of these units.

This fractional model can be transformed into a linear programming model by setting the denominator equal to a constant (normally set at 1) and adding it as an additional constraint, and transforming the variables (Charnes *et al.*, 1978). Greenberg and Nunamaker (1987) show how the transformed model can be simplified further for dimensionless measures such as ratios or ordinal rankings. Using their model, we can use DEA to measure risk, rather than efficiency. We solve for the optimal weights, using the numerator as the weighted sum of the risk factors:

$$\text{'Efficiency score'} = \text{audit risk} = \frac{\text{weighted sum of the risk factors}}{1} \tag{5}$$

Before describing the mathematics of our modified DEA model, we provide some intuition for our approach. For illustrative purposes, we describe an application of DEA using the Miltz *et al.* (1991) data in Table 2 for seven of the fifty-seven audit units and two of the six audit risk factors.

In Figure 2, we plot two risk factors (Control and Scope) that pertain to audit units 9, 18, 20, 23, 24, 31 and 55. The left-hand graph shows a high-risk frontier in which the higher the score, the greater the risk. Unit 18 is a high-risk unit that has high measures on both factors. Depending on the relative importance assigned to each factor, units 9 and 20 can also be regarded as high-risk, given their respective high scores on Control and Scope.

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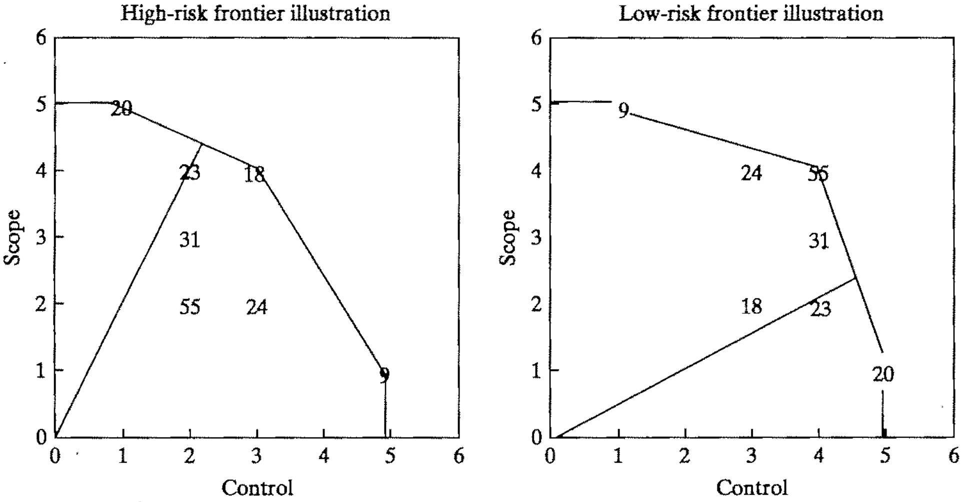
[6] For example, see Charnes and Cooper (1985), Banker *et al.* (1989), and Charnes *et al.* (1994). Charnes *et al.* (1994) includes a review of commercial DEA software.

FIGURE 2

HIGH- AND LOW-RISK FRONTIER FOR CONTROL AND SCOPE FACTORS


High-risk frontier illustration

Low-risk frontier illustration

| Audit unit | High-risk Control | High-risk Scope | Low-risk Control | Low-risk Scope |
|---|---|---|---|---|
| 9 | 5 | 1 | 1 | 54 |
| 18 | 3 | 4 | 3 | 2 |
| 20 | 1 | 5 | 5 | 1 |
| 23 | 2 | 4 | 4 | 2 |
| 24 | 3 | 2 | 3 | 4 |
| 31 | 2 | 3 | 4 | 3 |
| 55 | 2 | 2 | 4 | 4 |

Low-risk measures are obtained by converting the Miltz *et al.* (1991) risk rankings as follows:

| High-risk | Low-risk |
|---|---|
| 1 | 5 |
| 2 | 4 |
| 3 | 3 |
| 4 | 2 |
| 5 | 1 |

In the absence of any prior belief for an appropriate weighting, units 9, 18 and 20 form a frontier of maximum risk that dominates the remaining units 23, 24, 31 and 55. The relative distance from the frontier can measure the latter units' risk. For example, we measure the risk for unit 23 in terms of its distance along the ray that extends through 23 to the frontier. If 23 is located, say, 95 per cent of the distance along the ray, 95 per cent is the risk score assigned to that unit. Units on the frontier are assigned risk scores equal to 100 per cent (i.e., they are the highest risk units).

The right-hand graph in Figure 2 depicts a low-risk interpretation, in which the risk measures have been reversed. Under this interpretation, increasing values of the 'risk variable' are associated with lower risk (i.e., a value of 1 is high-risk and 5 is low-risk).[7] Units 9, 20 and 55 now form a low-risk frontier. The inclusion of units 9 and 20 in both the high- and low-risk frontiers results from their relative rankings on individual factors. For example, unit 9 is high-risk on Control but low-risk on Scope. Again, for those units that are not on the frontier, their distance from it measures the risk performance. This is illustrated by the ray passing through unit 23.

Figure 2 illustrates several key notions. First, the frontier contains alternative combinations of measures that represent potential maximum (minimum) risk. Second, the relative distance along a ray connecting them to the frontier can measure the riskiness of units not on the frontier. Identifying units on, or close to, the high-risk frontier and understanding the nature of the risks involved with those units is the major function of the auditor's risk assessment. Third, the intersection of this ray with the frontier enables the identification of benchmarks in the form of 'efficient' peers and target measures.[8] For example, in the right-hand graph, the unit 23 ray projects to the segment of the frontier that connects units 20 and 55. Thus, for this simple analysis, units 20 and 55 are appropriate 'peer' units. The DEA output also provides information on the target values of Control and Scope and the respective influence of each peer (units 20 and 55).

### *A DEA Audit Risk Model*

The general DEA 'efficiency' model maximizes the weighted output–input ratio of each decision-making unit subject to specified constraints. A simplified form of the DEA model to assess audit risk is as follows[9]:

$$\begin{aligned} \text{max} \quad & h_o = \sum W_i * F_{oi} \qquad (6) \\ \text{subject to} \quad & \sum W_i * F_{ji} \leq 1 \quad j = 1, \ldots, n \\ & W_i \geq 0 \end{aligned}$$

We solve this linear program for each unit where $h_o$ denotes the score obtained for the particular unit being assessed, conventionally designated '*o*'. For example, if we apply this to the data provided in Figure 2 for high-risk assessment, we would solve the model seven times corresponding to the number of audit units. In this example, the model formulation for DMU 18 would be:

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[7] This procedure simply re-ranks the data on low-risk. Thus a unit may rank high-risk on some factors but low-risk on others. The interpretation of a low-risk approach is discussed in a later section.

[8] We only consider peer benchmark units for low-risk analysis. Peer units for high-risk analysis are not intuitively appropriate.

[9] For comparative purposes we adopt the same notation used earlier. This formulation is equivalent to Greenberg and Nunamaker (1987) who show how the conventional DEA model can be used by exploiting the normalizing input constraint ($x_o^T v = 1$). All that is required is to assign values of unity to the inputs.

$$\begin{array}{lll}
\max_{(o=18)} & h_o = 3W_1 + 4W_2 & \\
\text{subject to} & 5W_1 + 1W_2 \leq 1 & \text{Unit 90} \\
 & 3W_1 + 4W_2 \leq 1 & \text{Unit 18} \\
 & 1W_1 + 5W_2 \leq 1 & \text{Unit 20} \\
 & 2W_1 + 4W_2 \leq 1 & \text{Unit 23} \\
 & 3W_1 + 2W_2 \leq 1 & \text{Unit 24} \\
 & 2W_1 + 3W_2 \leq 1 & \text{Unit 31} \\
 & 2W_1 + 2W_2 \leq 1 & \text{Unit 55} \\
 & W_1, W_2 \geq 0. &
\end{array}$$

We compute the value of $h_o$ for each unit in turn by changing the respective values of the factors in the maximization objective. Note that the same factor values for the unit under evaluation appear in both the expression to be maximized and the constraint set. The logic behind this is that a unit that is both efficient and on the frontier will have its own corresponding constraint active (an equality) with all other constraints inactive (inequalities).[10]

The classical application of DEA places no constraints (other than being non-negative) on weights. This allows a DMU's efficiency to be assessed using the weights most favourable to optimize its own score. For example, in Figure 2, unit 20 would like to place all its weight on Scope and none on Control. The opposite would apply for unit 9.

However, the decision to include a factor in a particular analysis will typically represent a researcher's (or auditor's) implicit judgment that the factor should have a non-trivial weighting. It therefore seems inappropriate to assess a unit using a zero-weight for a particular factor. Thus there is a strong case for imposing weight restrictions by imposing upper and lower bounds.[11] In our analysis we use the upper and lower values assigned by audit experts, as reported in Table 1. To illustrate, the contribution to the risk score from the Size factor must lie between 6.4 per cent and 37 per cent.

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[10] This assumes strong efficiency. Weak efficient and/or non-referent efficient audit units may have solutions with active constraints on other strong efficient referent units.

[11] The implications of imposing weight restrictions are well documented in the DEA literature (see Allan *et al.*, 1997, for an incisive summary). The imposition of weight constraints can never improve DEA scores and may worsen them. In our application, several of the weight constraints were active and led to lower DEA scores for affected DMUs. The type of weight constraint was for virtual weights and the software used (University of Warwick) handled these without difficulty. We also checked the computations with our own DEA and LP software.

## DEA AND AUDIT RISK ASSESSMENT

In this section, we show how DEA makes better use of the range of weights identified by the internal audit experts to develop a risk index. Our intention is to demonstrate the use of DEA as a worthwhile alternative to the analytical hierarchical process for determining the risk scores of individual audit units (step 4 in Figure 1). We apply DEA to the full data set comprising the six risk factors (Table 1) and individual measures for each of the fifty-seven audit units (Table 2).

By using the data from Miltz *et al.* (1991), we present results that are similar to a controlled experiment. We do not introduce any additional risk factors into our analysis, which enables us to compare the DEA risk scores with those reported by Miltz *et al.* (1991). We do not use the DEA risk scores to allocate audit resources (step 5 in Figure 1); the development of a risk index and the allocation of resources based on that index are independent activities and we have nothing further to contribute to the Miltz *et al.* study.

Thus, the aim of this article is to show how DEA is able to provide an audit risk index that reflects a more representative view of the audit experts' opinions than the single-point median value used in the Miltz *et al.* (1991) AHP analysis.

In addition, the frontier-based concepts underpinning DEA permit a polarization of risk perspectives to be analysed. The results of the DEA assessment for both a high and low audit risk are reported in columns 9 and 10 of Table 2. These can be compared with the AHP audit risk index in column 8. Figure 3 plots the DEA audit risk score for each audit unit under the high- and low-risk perspectives. For comparison purposes we also plot a relative measure of the AHP risk index in which each audit unit's risk score is expressed as a percentage of the audit unit with the highest risk score.

### *High-risk Assessment*

The DEA high-risk score and the AHP risk index are comparable measures of risk for each audit unit.[12] However, even though the DEA risk score and the Miltz *et al.* (1991) index are similar, they are not identical. We observe from Figure 3 that many audit units lie above the AHP line. Audit units with a DEA risk score above (below) AHP index require more (less) auditing than the AHP consensus auditor.

An examination of DEA risk scores for units above the AHP consensus auditor reveals that many units have weights constrained by the upper value (as per Table 1) on the Pressure variable (i.e., 11.2 per cent) and the lower bound on Control (i.e., 9.3 per cent) and Scope (i.e., 5.6 per cent). Some units also reach the upper bounds on other factors, for example, units 14 and 16 on Change (i.e., 44.9 per cent) and unit 42 on Environment (i.e., 11.5 per cent). This suggests that, for these units, although internal controls and the scope of business activities are

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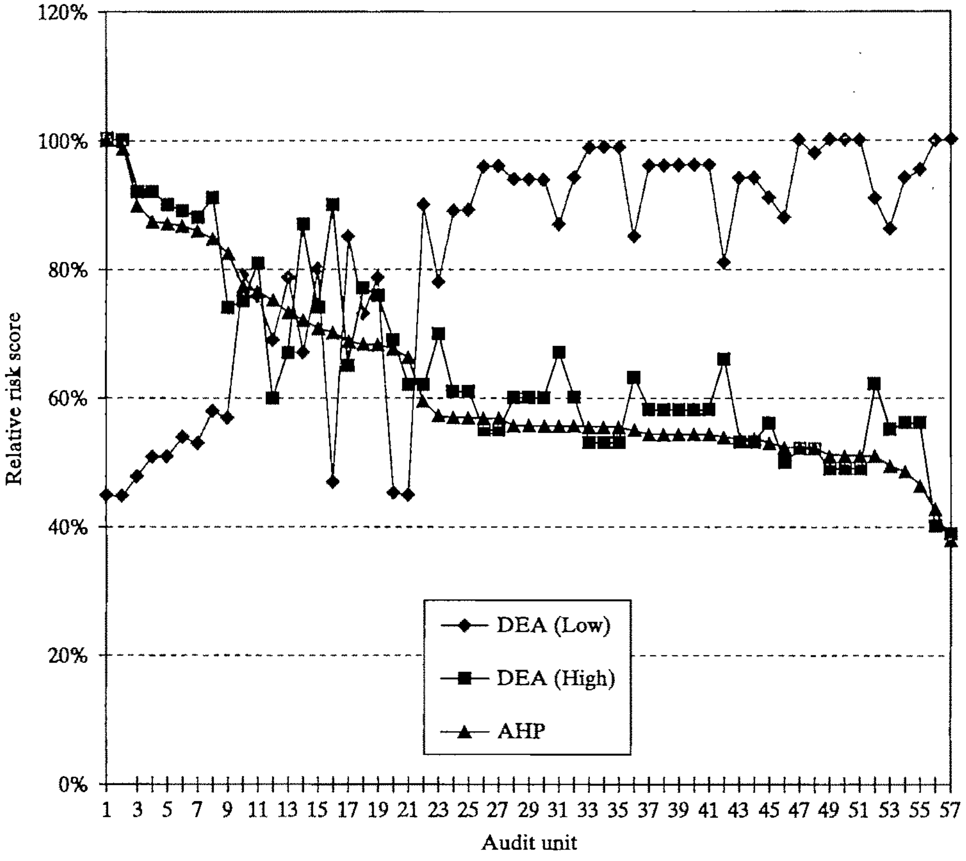
[12] The Spearman correlation between the AHP risk index and the DEA high-risk bounded (unbounded) analysis is 0.87 (0.75).

FIGURE 3

COMPARISON OF RISK SCORES FOR EACH AUDIT UNIT



important, they are not as critical to the assessment of total audit risk as internal pressures, changes and environmental influences.[13]

DEA assesses several units in Figure 3 as less risky than does AHP consensus auditor. For example, unit 12 is high-risk in terms of Controls, Change and Environment risk factors, but low-risk in terms of Size, Pressure and Scope.

The high-risk DEA analysis produces a risk score that is comparable to the AHP risk index. This score can then be used to allocate audit resources (see step

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[13] One of the reviewers believed this to reflect over-specification of the model. We believe that this is not necessarily bad for several reasons. First, the imposition of weights, allows the model to reflect additional information that is external to the data set (i.e., professional auditors' opinion). Second, for practical purposes, the model is trying to identify high-risk units for a specific data set, as opposed to building a general risk model for other data sets. Third, the advantage of DEA is that it provides a specified dependent variable (audit risk) that did not exist until the risk factors are weighted. We believe a practitioner would prefer having a model that potentially overfitted to having no model at all.

5 in Figure 1) in the same manner demonstrated by Miltz *et al.* (1991). However, rather than be constrained by a consensus view that might not be representative of experts' opinions (refer to notes 2 and 3), DEA uses the variation in audit expert opinions as limits for the DEA risk score.

### *Low-Risk Assessment*

One of DEA's major advantages is that in addition to providing a basis for allocating audit time, it also produces diagnostic data for benchmarking. For this exercise, it might be preferable to use a low-risk DEA analysis.

Since DEA seeks to maximize the score for an audit unit under either perspective, both 'best' and 'worst' values of individual factors might exist within a single unit. For example, recall in Figure 2, audit unit 9 has an efficiency score of 100 per cent on a high-risk basis because of poor internal control. The same unit also has an efficiency score of 100 per cent on a low-risk basis because of its low-risk in terms of Scope.

For each unit, DEA produces diagnostic data that identifies efficient peer units and risk measures. An extract of a typical DEA output (for units 12, 23 and 57) is shown in Table 3. The first column identifies the audit unit and the DEA risk score. Columns three and four report the actual assessed risk measure for each risk

TABLE 3

EXTRACT FROM TYPICAL DEA OUTPUT (LOW-RISK)

| Unit and efficiency | Risk factor | Actual | Target | Peer(s) | Lamda(s) | Weights virtual |
|---|---|---|---|---|---|---|
| Unit 12 | Size | 5 | 5 | Unit 57 | 1.25 | 4.24% |
| 69.14% | Internal control | 1 | 5 | | | 9.30% |
| | Change | 3 | 5 | | | 11.50% |
| | Environment | 2 | 5 | | | 3.20% |
| | Pressure | 5 | 5 | | | 5.60% |
| | Scope | 5 | 5 | | | 35.30% |
| Unit 23 | Size | 3 | 3.2 | Unit 57 | 0.8 | 2.80% |
| 78.89% | Internal control | 4 | 3.2 | | | 47.40% |
| | Change | 4 | 4 | | | 11.50% |
| | Environment | 1 | 3.2 | | | 3.20% |
| | Pressure | 4 | 4 | | | 8.39% |
| | Scope | 2 | 3.2 | | | 5.60% |
| Unit 57 | Size | 4 | 4 | Unit 57 | 1.0 | 2.80% |
| 100% | Internal control | 4 | 4 | (itself) | | 47.40% |
| | Change | 5 | 5 | | | 35.40% |
| | Environment | 4 | 4 | | | 3.20% |
| | Pressure | 5 | 5 | | | 5.60% |
| | Scope | 4 | 4 | | | 5.60% |

factor (as per Table 2) and a target risk measure that would place the unit on the frontier. The next two columns report the efficient peer unit(s) that are appropriate for benchmarking and their relative location to the projected point on the frontier (lamda). For units 12 and 23, there is only one efficient peer unit 57. The last column reports the optimal virtual weights. Virtual weights measure the percentage contribution of each factor to the risk score. For example, the virtual weights for unit 12 (4.24, 9.3, 11.5, 3.2, 5.6, 35.3) sum to 69.14 per cent. The single most important factor is scope, which contributes 35.3 per cent to the overall risk score.

DEA output identifies audit unit 57 as a peer for Units 12 and 23. Note that unit 57 has a low-risk score of 100 per cent. The virtual weight on internal control for unit 12 is only 9.3 per cent compared to 47.4 per cent for unit 57. Thus, for benchmarking purposes, a unit manager who wishes to improve internal control in unit 12 should consider that the internal controls in place in unit 57 are indicative of 'best practice'.[14] On the other hand, unit 23 has the same virtual weight on internal control as unit 57, but could improve its low-risk score by improving Change.

*Time-Series Analysis*

Using the Miltz *et al.* (1991) data, we have concentrated on a cross-sectional analysis of audit risk.[15] Where panel data is available, DEA can be used in a time-series analysis to measure shifts in the risk frontier over time. Changes in audit risk can be decomposed into the relative change in 'best practice', which is represented by a shift in the risk frontier; and the relative change in the risk rating of each audit unit over time (i.e., whether its audit risk is increasing or decreasing).

## SUMMARY AND DISCUSSION

The increasing focus on risk-based auditing (Cushing *et al.*, 1995) suggests that attention will be directed towards developing and improving quantitative methods of assessing audit risk. This article demonstrates the use of DEA as a method of assessing audit units by aggregating and weighting audit risk assessments.

DEA represents a worthwhile alternative to other methods for scoring audit units according to risk (e.g., subjective assessment and the analytic hierarchy process) and has several advantages. First, DEA can handle multiple input and output variables measured in different units. In this study the assessment of risk for each factor was measured on a scale of 1 to 5. However, DEA can employ continuous measures (e.g., dollar values for an abnormal account balance or the number of transactions) as well as binary variables (e.g., the existence of a qualified accountant at the audit unit). Second, unlike simple central-tendency measures, DEA can accommodate a range of expert opinions for weighting risk factors. It is therefore particularly suitable when there is a small number of audit experts who have differing views on the weighting of risk factors. Third, DEA can be used to undertake cross-sectional and time-series analysis. Fourth, DEA can be used to adopt a high-risk and low-risk perspective. Fifth, DEA output provides diagnostic data that identifies peer units and peer risk measures.

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[14] This will depend on the resource constraints and on firm policies. For example, it might be cheaper to do additional audit verification than improve controls.

[15] Only cross-sectional data is provided in Miltz *et al.* (1991) and we are unable to illustrate a time-series approach. For the earlier conceptual roots of time-series DEA refer to Caves *et al.* (1982). For an example of time-series financial statement data see Thore *et al.* (1994).

Given these advantages, there are many situations in which DEA can be useful for the assessment of audit risk by external and internal auditors. The most obvious use for external auditors is the assessment of audit risk among multi-location clients. DEA can also be used to assess audit risk across a portfolio of audit clients and to assess the time-series change in audit risk of those clients. A possible drawback to using DEA to obtain audit risk scores is that as variables are added, the risk scores become non-decreasing. That is, as more variables are added, an audit unit is more likely to be found efficient (high or low-risk), thereby limiting DEA's discriminating ability. We have shown that using a bounded analysis reduces and often overcomes this deficiency. We also note that increasing the number of variables affects other risk assessment methods. For the analytical hierarchical process model, this increases the number of pairwise comparisons that must be made.

As an internal audit tool, DEA can provide a useful basis for prioritizing improvements to audit risk in each unit. By adopting a low-risk perspective, it identifies peer units that can be used for benchmarking purposes and identifies the risk factors that need to be improved in order to move that audit unit to the low-risk frontier.

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# The Information Content of Management's Prospective Comments in Financially Distressed Companies: A Note

Prior research revealed management's prospective comments (MPCs) in annual reports to be informative with respect to companies' future performance. As the finding was derived from analyses of random samples of companies, it is not known whether it is generalizable to companies that are experiencing financial distress. This study investigates whether disclosure of MPCs in the annual reports of companies experiencing financial distress is informative with regard to their future viability. The MPCs of 140 Australian public companies that had experienced significant losses were identified and then categorized as optimistic, pessimistic, mixed or no MPCs. Results from logistic regression analysis indicate that such MPCs provided information incremental to that contained in historical financial information about companies' future viability. It was also found that, while companies that did not disclose any MPCs were more likely to fail than companies that disclosed optimistic MPCs, they were as likely to fail as companies that disclosed pessimistic or mixed MPCs. This suggests that financially distressed companies avoid disclosing MPCs in the absence of an optimistic outlook, a finding that supports Darrough and Stoughton's (1990) theory of selective disclosure.

**Key words:** Annual reports; Disclosure; Inadequate disclosure; Information; Management's prospective comments.

Studies that investigate management's prospective comments (MPCs)[1] in annual reports (e.g., Steele, 1982; Clarkson *et al.*, 1994; Bryan, 1997) have generally found that such comments are informative with respect to the future performance of the

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[1] MPCs are defined as statements of belief or opinion held by management on a company's future prospects. These comments are usually qualitative in nature, and are usually found in the managements discussion and analysis (MD&A) section of the annual report. In Australia, where there is no required MD&A, such disclosures are found in sections other than the financial statements in the annual report (referred to as 'Other Information' in the auditing standard).

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reporting companies. However, as these studies analysed random samples of companies that comprised both financially healthy and distressed companies, it is not known whether the findings are generalizable to companies in financial distress. This provides the primary motivation for the present study, which is to investigate the information content of MPCs disclosed by financially distressed companies.

Using a game theoretic approach, Darrough and Stoughton (1990) show that companies have an incentive to engage in selective disclosure that is conditional on market conditions, in order to meet their own objectives. It has also been suggested that in circumstances of financial distress, management may have a greater tendency toward overstating a company's future prospects (Weber, 1990). Since MPCs are from a non-independent source, such information may reflect attempts by management to issue statements which downplay the financial distress the company is experiencing (Mutchler *et al.*, 1997).[2] Concern over the potential bias in MPCs of financially distressed companies is evidenced by the discounting of distressed companies' positive MPCs by stock market participants (Frost, 1997).

Work here is distinguished from prior studies in two ways. First, it investigates the MPC disclosure strategy of financially distressed companies, a significant proportion of which failed in the following year. It is important to analyse the MPC disclosures for this group of companies, as the incentives for management to disclose such information may differ in times of financial distress. Second, whether MPC disclosures by such companies can provide information additional to that found in the financial information regarding their ongoing viability is assessed. Analysing the annual reports of 140 financially distressed companies in Australia, it is found that MPCs could signal company failure. Such information content is further found to be beyond that contained in historical financial ratios. Implicit in the findings is that financially distressed companies were engaging in selective disclosure of MPCs. Consistent with the theory proposed by Darrough and Stoughton (1990), when companies are experiencing financial distress, financial market considerations dominate product market considerations. Hence, financially distressed companies disclose MPCs if they are optimistic in nature and withhold MPCs otherwise.

The findings are of interest to all users of financial statements, who in situations of financial distress will be more concerned with comments about a company's future prospects, and with the reliability of such comments. Investors, creditors and bankers need to decide whether or not to continue holding the investment, to provide continuing financial support to the financially distressed company or to 'pull the plug', thereby mitigating further losses. It is therefore important to investigate whether MPCs assist or mislead users about the prospects of financially distressed companies. The results are also of interest to policy makers as they provide evidence on the reliability of such future oriented disclosures.

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[2] Companies have been found to voluntarily disclose bad news in order to avoid litigation costs (Pownall *et al.*, 1993; Skinner, 1994, 1995, 1997). While such a finding may offset part of the expected effect outlined in this study, the research outlining this finding has not been specifically aimed at financially distressed companies. It is argued that efforts to instill market confidence in order to obtain continuing financial support are expected be more critical for financially distressed companies, the unit of analysis in this study. Thus, it is anticipated that there is a greater incentive for financially distressed companies to highlight good news and downplay bad news (Weber, 1990; Mutchler *et al.*, 1997).

## LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

There has been considerable support for the inclusion of prospective information in annual reports (Collins *et al.*, 1993; Clarkson *et al.*, 1992, 1994; Rotenberg, 1994). In the Australian setting of this study where this study was conducted, there have been proposals for management discussion and analysis (MD&A) to be made a mandatory component of financial reporting (Parker, 1996, 1998). Such development underlies the importance placed on MPCs to complement historical financial information in the annual report. Currently, the Corporations Law in Australia requires companies to disclose in the directors' report any post balance date events that may significantly affect future results, together with the expected future results. The Corporations Law, nevertheless, allows such information to be omitted if the directors have reasonable grounds to believe that its inclusion would be likely to unreasonably prejudice the company. Providing such flexibility may potentially be counterproductive as it could be exploited by companies that selectively disclose in order to meet their individual or corporate objectives at the expense of an informed market.

### *Selective Disclosure of MPCs*

It is not known whether companies engage in selective disclosures in an environment where they are legally required to disclose expected future results and post balance date events that may significantly affect future results. A concern arises in these circumstances because of a lack of an effective monitoring mechanism to ensure full compliance with the mandatory requirement, especially where companies are experiencing financial distress. Such companies may choose to reveal or withhold their prospective information depending on the direction of the MPCs (good news or bad news) and the purpose to be served in disclosing MPCs. Selective disclosure is particularly likely in a regulatory environment (such as that of Australia) that allows management the discretion to withhold information that company directors deem would unreasonably prejudice the company.

Drawing from the theory advanced by Darrough and Stoughton (1990), Clarksonet *et al.* (1992) and Clarkson *et al.* (1994) found that companies with good news (e.g., optimistic MPCs) were more likely to disclose MPCs if financial market considerations (i.e., the need for external financing) dominate the product market considerations (i.e., the threat of competitor entry), and vice versa. Based on this theory, we argue that, for companies experiencing financial distress, the need for financing support from bankers and suppliers overrides the concern of the threat from competitor entry. The fact that companies are experiencing significant losses is in itself a signal to potential competitors that it may not be profitable for them to enter into the industry. Hence, financially distressed companies are more likely to disclose MPCs in their annual reports if they contain good news. The corollary is that when no MPCs are disclosed, it is likely that financially distressed companies do not have good news to disclose, and hence their prospects are expected to be less favourable. It follows that financially distressed companies that do not disclose MPCs, and those that disclose mixed and pessimistic MPCs, are expected to have poorer prospects than financially distressed companies that disclose optimistic MPCs.

### *Information Content of MPCs*

There is another body of literature which has examined management's narrative disclosures using a content analysis methodology. These studies support the view that those disclosures are useful for predicting companies' future performance. Tennyson *et al.* (1990) analysed the narrative disclosures in annual reports of a matched sample of bankrupt and non-bankrupt companies and found that healthy companies focused on internal operations, growth and expansion factors to a greater extent than companies approaching bankruptcy. Abrahamson and Amir (1996) measured the information content of the president's letter based on the number of words with negative connotation (and ignoring the positive statements) and found strong association between this measure and company sales, earnings and returns. Bryan (1997) analysed the MD&A section of a random sample of 250 companies in the CRSP database in 1990 and noted that certain MD&A disclosures, particularly the discussions of future operations and planned capital expenditures, are associated with future, short-term performance measures, after controlling for information contained in financial ratios. In the U.K. context, Smith and Taffler (2000) similarly found the chairman's statement to be highly predictive of company failure. A number of other studies have undertaken a similar approach to analyse the thematic and syntactic aspects of narrative information in order to investigate their content and readability (see Jones and Shoemaker, 1994, for a summary). Unlike those studies, this work examines MPCs, a subset of narrative information that may or may not be disclosed by management in annual reports.

The information value of MPCs can be attributed to the access by management to more facts (including those not publicly available), superior organizational knowledge, and expertise acquired through formal education, work experience and investment in company-specific information (Myers and Majluf, 1984; Rotenberg, 1994). Underlying the information content of MPCs is not only a presumption that management possesses the technical ability to foresee future prospects, but also a requirement that management be unbiased in their reporting. In a non-mandatory disclosure environment, there is a concern that management may intentionally disclose misleading MPCs. The incentives to intentionally deceive or to be overoptimistic concerning a company's future prospects may be greater for financially distressed companies (Weber, 1990; Mutchler *et al.*, 1997).

The incentive for a company to disclose biased or misleading MPCs must be discussed in conjunction with factors that may deter management from doing so. First, fears for management's reputation may discourage companies from making gross misrepresentations (Hoskin *et al.*, 1986; Frankel *et al.*, 1995) as MPCs are verifiable against subsequent actual outcomes. Preserving management reputation with respect to credibility of information disclosure, however, may be of lower priority when the survival of the distressed company is at stake. This may explain the perceived lack of credibility associated with positive disclosures by financially distressed companies, as measured by negative price reactions (Frost, 1997). Second, biased reporting may be constrained by costs of potential litigation (Eisenberg, 1993; Bannister *et al.*, 1995; Skinner, 1995). Third, to the extent that MPCs relate to industry-wide facts and companies are commonly affected by macroeconomic factors, MPCs can be evaluated against those of other companies within the same industry (Schipper, 1990).

This discussion on the selective disclosure and expected information content of MPCs for financially distressed companies leads to the following testable hypothesis:

H: *Ceteris paribus*, financially distressed companies that disclose optimistic MPCs are less likely to fail within the next year than are other financially distressed companies.

## RESEARCH METHOD

### *Data Collection*

In order to identify companies to be included in the sample, all companies listed on the Australian Stock Exchange with a significant loss in 1990 or 1991 were identified.[3] A significant loss was defined as a loss before tax and after extraordinary items over total assets ratio of 5 per cent or more. Loss-making as a criterion for financial distress has been used in prior studies (e.g. Peel and Peel, 1987; Gilbert *et al.*, 1990; Hopwood *et al.*, 1994; and Mutchler, 1985). For identifying significant loss-making companies, this study adopts a more stringent criterion of a loss greater than 5 per cent of total assets.

A total of 178 companies were identified which met this sample selection criterion.[4] The principal activities of the companies in the sample were identified by their description contained in the Australian Stock Exchange Research Service. After excluding companies in the financial services industry,[5] the number of companies was reduced to 140.[6] Of the 140 companies, 13 (of which one failed in the next financial year) were in agriculture, 12 (7 failed) in construction, 30 (7 failed) in manufacture, 10 (none failed) in mining, 49 (11 failed) in service, 9 (2 failed) in trading, and 17 (6 failed) were diversified. Table 1 presents the types of MPCs disclosed and the failure status of these financially distressed companies within the next year.[7] Results of a 2 (optimistic MPCs versus others) × 2 (failure status) Chi-square

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[3] If a company's losses in both years met the selection criterion, one of the two years was randomly selected.

[4] Eighty-one per cent and 54 per cent of the companies in the sample experienced losses of at least 5 per cent over total assets for two and three consecutive financial years respectively.

[5] Companies in the financial services industry were excluded because their financial ratios are not necessarily comparable to those of companies in other industries (see, e.g., Dopuch *et al.*, 1987).

[6] A list of the 140 companies is available upon request from the first-mentioned author.

[7] Failed companies were defined as companies that were delisted from the Australian Stock Exchange for reasons relating to financial distress, either voluntarily or by compulsion.

TABLE 1

AN ANALYSIS OF DATA OBSERVATIONS BY FAILURE STATUS AND MPC DIRECTIONS

| | Failure status (next year) | | |
|---|---|---|---|
| MPC directions | Failed | Non-failed | Total |
| Pessimistic (P) | 3 | 6 | 9 (6.4%) |
| Mixed (M) | 3 | 2 | 5 (3.6%) |
| Silent (S) | 15 | 21 | 36 (25.7%) |
| Total (P, M, S) | 21 | 29 | 50 (35.7%) |
| Optimistic | 13 | 77 | 90 (64.3%) |
| | 34 (24.3%) | 106 (75.7%) | 140 (100%) |

test are significant ($p = .0006$, $\chi^2 = 11.82$, $df = 1$). This indicates that, without controlling for company size and financial ratios, MPCs potentially have information content with respect to company failure. None of the MPCs was quantitative in nature. This was consistent with Clarkson *et al.* (1994) and Kasznik and Lev's (1995) findings that virtually all MPCs in annual reports are qualitative in nature.

### *Classification of MPCs*

The majority of MPCs were found in the chairman's/managing director's/chief executive's report in the annual report. To qualify as MPCs, management's comments had to be indicative of the company's likely prospects, as opposed to company goals or contingent statements. MPCs were classified into four groups: (a) optimistic, (b) pessimistic, (c) mixed outlook,[8] and (d) no comments about company's future performance. Examples of the optimistic and pessimistic MPCs are contained in Table 2. Some of the companies that did not disclose MPCs justified the omission of such information on the grounds that its inclusion would be likely to unreasonably prejudice the company.

The MPCs were classified by one of the researchers and then by an independent coder, and the results were then compared for any discrepancies.[9] The classification results of the two parties were subjected to Cohen's (1960) Kappa

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[8] Companies classified in the mixed outlook category were those with both optimistic and pessimistic prospective comments, neither of which were clearly dominant. For example, the disclosing company had various business components, some of which were expected to perform well while others were expected to perform badly, and there was no summary or concluding prospective comments for the company.

[9] Independent coding by two coders was used rather than content analysis (as used by Abrahamson and Amir, 1996), as it would be unusual that users assessing information content would use tools or aids such as content analysis to analyse and determine the underlying message in MPCs. The message contained in MPCs is assessed in terms of how they would normally be interpreted by human processors (i.e., financial statement users).

TABLE 2

EXAMPLES OF OPTIMISTIC AND PESSIMISTIC MPCS

| Optimistic | Pessimistic |
|---|---|
| 'Company will return to profitability . . .' | 'Remain concerned with the market downturn . . .' |
| 'Should be reflected in improved trading results . . .' | '1991/92 will pose difficulties for all businesses . . .' |
| 'Will produce far better results for 1992 . . .' | 'Outlook is extremely depressed . . .' |
| 'We are optimistic that this year will see a significant improvement in the group's performance.' | 'The outlook for the current year is for continued difficult trading conditions . . .' |
| 'Anticipate that the coming year will see the Company return to a more comfortable position . . .' | 'While I cannot paint a rosy picture for you, it will be important that you, as shareholders, remain patient, understanding and supportive.' |
| 'We are expecting a profit this year . . .' | 'The immediate future will continue to be difficult . . . this will intensify downward pressure on occupancy and room rates and, as a result, profitability.' |
| 'Your Company expects to report a profit for the current financial year.' | 'The uncertainties . . . coupled with the difficulties of the prevailing economic climate, warrant a cautious and conservative approach . . .' |
| 'We . . . believe that the next twelve months will firmly establish [company] as a profitable supplier of plastic . . .' | 'Given the level of indebtedness, and the longer term nature of the market of the company's products, returns to shareholders are not foreseen in the short term.' |

inter-rater agreement test. A highly significant Kappa value (0.71, $t$ = 11.5) revealed high inter-rater agreement in the classifications of MPCs. Differences in the classifications of MPCs were resolved by discussion between the two raters.

### *Variables of Interest*

In the current work, the continuing existence or otherwise of financially distressed companies was analysed using logistic regression analysis. The dependent variable in the logistic regression is company failure. Company failure (FAIL) is a dichotomous variable where 1 signifies failure within the following year, and 0 otherwise.

The independent variable of interest, management's prospective comments (MPCs), is represented by a dichotomous variable where 1 signifies optimistic MPCs and 0 signifies other MPCs, comprising pessimistic MPCs, mixed MPCs and no disclosure of MPCs. As the hypothesis to be tested states that financially distressed companies disclosing optimistic MPCs are less likely to fail than other financially distressed companies, these pessimistic, mixed or non-disclosing companies are grouped together (although this grouping is later relaxed, as reported in the sensitivity analysis section of this article). It was also noted that companies disclosing pessimistic MPCs (nine observations from a total of 140 observations, or 6.4 per cent) and mixed MPCs (five observations, or 3.6 per cent) were few in number.

There were two sets of control variables: company size and financial ratios. Company size is controlled for, as larger companies are less likely to fail (Boritz, 1991, Morris, 1997). Boritz (1991) attributed this in part to 'the fact that large companies may be reorganized through a receivership, they are less dependent upon their owners, and they are more likely to have saleable subsidiaries or divisions' (p. 146). Consistent with Dopuch *et al.* (1987) and Chen and Church (1992), company size was defined as the natural logarithm of total assets (LTA).

The second set of control variables comprised financial ratios (RATIOS). Although companies investigated in this study were all significantly loss-making, there were varying degrees of financial distress.[10] As financial ratios may reflect the extent of financial distress, they were included as control variables in the logistic regression. This enabled the incremental information value contributed by MPCs beyond that of the control variables in the logistic regression to be assessed.

Several research studies in the failure prediction literature (e.g., McKeown *et al.*, 1991) and the going-concern qualification literature (e.g., Louwers, 1998; Mutchler *et al.*, 1997) have drawn on the prediction model developed by Hopwood *et al.* (1989). Thus the following six ratios from Hopwood *et al.*'s model are included as control variables:

| | |
|---|---|
| Net income/Total assets | (INC) |
| Current assets/Total assets | (CATA) |
| Current assets/Current liabilities | (CUR_RAT) |
| Cash/Total assets | (CASHTA) |
| Current assets/Sales | (CASALES) |
| Long-term debt/Total assets | (GEARING) |

Other dimensions of financial distress that are adapted from Ohlson's (1980) model are added to Hopwood *et al.*'s (1989) model. The inclusion of these variables is supported by research such as that undertaken by Begley *et al.* (1997). The three additional variables are[11]:

| | |
|---|---|
| Cash flows from operations over total liabilities | (CFTL) |
| The number of years of losses in the past three years | (LOSS_Y), and |
| The relative change in net profit after tax from prior year | (XNPAT). |

---

[10] The probability of failure for each company within the sample was determined based on Zmijewski's (1984) financial distress model. A median probability of failure within one year of 71.2 per cent was obtained. Approximately two-thirds of the sample (90 of 140) had a probability of failure of greater than 50 per cent, indicating a large proportion of high distress for the sample in general.

[11] The addition of these three variables does not cause any potential multi-collinearity problem as none of the VIF is greater than 2.1.

## RESULTS

### *Descriptive Statistics*

The descriptive statistics of the financial variables used in this study are presented in Table 3. The observation of Frecka and Hopwood (1983), Lee (1985) and Elliott and Kennedy (1988) that most accounting data are not normally distributed is similarly observed in this study. However, this is not a major concern as logistic regression is robust with respect to non-normal distributions.[12] The correlations

TABLE 3

DESCRIPTIVE STATISTICS FOR VARIABLES IN LOGISTIC REGRESSION MODEL

| Variables | Full sample ($n = 140$) | | Optimistic ($n = 90$) | | Other ($n = 50$) | | $t$-test (Optimistic vs Other) | |
|---|---|---|---|---|---|---|---|---|
| | Mean | *SD* | Mean | *SD* | Mean | *SD* | $t$-value | prob. (1-tail) |
| CATA | 0.341 | 0.243 | 0.341 | 0.230 | 0.341 | 0.268 | −0.01 | .494 |
| CASHTA | 0.051 | 0.118 | 0.050 | 0.121 | 0.052 | 0.114 | 0.08 | .469 |
| CUR_RAT | 1.404 | 2.829 | 1.162 | 1.077 | 1.840 | 4.505 | 1.05 | .150 |
| CASALES | 3.922 | 24.752 | 4.933 | 30.066 | 1.969 | 7.207 | −0.64 | .261 |
| GEARING | 0.280 | 0.985 | 0.192 | 0.261 | 0.437 | 1.610 | 1.07 | .146 |
| INC | −0.930 | 3.433 | −0.449 | 0.611 | −1.799 | 5.618 | −1.69 | .049* |
| CFTL | −0.958 | 8.833 | −1.356 | 10.843 | −0.228 | 2.336 | 0.72 | .237 |
| XNPAT | −5.395 | 9.767 | −5.906 | 10.369 | −0.4467 | 8.590 | 0.83 | .205 |
| LOSS_Y | 2.382 | 0.751 | 2.295 | 0.805 | 2.542 | 0.617 | 1.99 | .025* |
| TA ($M) | 67 | 182 | 80 | 215 | 44 | 97 | −1.12 | .134 |

$M = $ million.
* Significant < .05.

CATA = current assets/total assets.
CASHTA = cash/total assets.
CUR_RAT = current assets/current liabilities.
CASALES = current assets/sales.
GEARING = long-term debt/total assets.
INC = net income/total assets.
CFTL = cash flows from operations/total liabilities.
XNPAT = relative change in net profit from prior year.
LOSS_Y = number of loss years within the past three years.
TA = total assets.

---

[12] The high values of skewness and kurtosis of some variables are indicative of the presence of outliers that may distort the mean values. The data set was therefore 'winsorized' by changing outliers and extreme values to that of the closest non-outlier. The outliers and extreme values were identified by the SPSS program as cases with values of 1.5 or more box-lengths from the edge of the boxplot (the lower boundary of the boxplot is the 25th percentile, and the upper boundary is the 75th percentile) (Norusis, 1990).

between independent variables were also analysed. Although some positive correlations were observed, no variable may be considered as a proxy for any other variable, with the highest absolute correlation observed being 0.41 (between the current assets to total assets ratio and the current ratio). Table 3 shows that there are no significant differences between companies that disclose optimistic MPCs and other companies except for net income and the number of years of losses.

### *The Information Content and Selective Disclosure of MPCs*

The annual reports were analysed to determine whether MPCs were associated with the continuing existence of financially distressed companies in the following year. It is posited that financially distressed companies that disclose optimistic MPCs are less likely to fail within the next year than other financially distressed companies. Table 4 presents the results of a logistic regression analysis with FAIL as the dependent variable, and MPCs and the control variables (i.e., financial ratios and company size) as the independent variables.[13]

MPCs were found to be a significant predictor variable ($p = .0056$). The results indicated that, after controlling for size and financial information expressed in the form of ratios, companies disclosing optimistic MPCs were less likely to fail compared to other companies. Hence, the hypothesis in this study is supported. The addition of the MPCs variable to the model which contains only control variables increases the overall model chi-square by 8.02 (1 *df*, $p = .0046$).[14] This indicates that MPCs contain information additional to that found in historical financial ratios, with respect to companies' future financial viability.

The current ratio is the only other significant variable in the model ($p = .0385$).[15] This observation is consistent with results in the failure prediction literature (Peel and Peel, 1987; Gilbert *et al.*, 1990; Hopwood *et al.*, 1994) that indicate the poor performance of financial ratios in predicting the failure of companies in distress. Multicollinearity is unlikely to be a problem in the regression as none of the variables has a variance inflation factor of more than 10 (maximum = 2.075) (Neter *et al.*, 1987, p. 392).

---

[13] The logistic regression was run on 125 companies. The missing observations were mainly due to companies having sales of zero and one company not disclosing sales. Thus, the ratio CASALES could not be calculated.

[14] Correct classification rates for models with and without MPCs are 81.6 per cent and 78.4 per cent, respectively.

[15] Likewise, Hopwood *et al.* (1989) also found that there was only one control variable significant in the model for one-year prediction prior to bankruptcy, being net income over total assets ratio. The current ratio was not significant in this particular model but was the second significant financial variable for the models developed using information two to five years before bankruptcy. This 1989 study used a matched sample of bankrupt and non-bankrupt companies. Also, Mutchler *et al.* (1997) found that two financial ratios, net income over total assets and current ratio, were the only two financial ratios significant (at $p < .01$) in their analysis of stressed bankrupt versus stressed non-bankrupt companies.

TABLE 4

LOGISTIC REGRESSION: FAIL = F(MPCS, RATIOS, SIZE)

| Variable | Expected sign | Coefficient | Standard error | Wald | *p* value |
|---|---|---|---|---|---|
| Variables of interest | | | | | |
| MPCs | – | –1.42 | 0.51 | 7.66 | .0056** |
| Control variables | | | | | |
| INC | – | –0.68 | 0.79 | 0.75 | .3871 |
| CUR_RAT | – | –1.53 | 0.74 | 4.28 | .0385* |
| GEARING | + | –0.18 | 1.29 | 0.02 | .8895 |
| CASHTA | – | –11.37 | 10.39 | 1.20 | .2735 |
| CATA | – | 1.39 | 1.43 | 0.94 | .3330 |
| CASALES | – | –0.53 | 0.67 | 0.63 | .4267 |
| CFTL | – | –0.94 | 1.52 | 0.38 | .5360 |
| XNPAT | – | 0.004 | 0.05 | 0.005 | .9439 |
| LOSS_Y | + | 0.05 | 0.40 | 0.01 | .9092 |
| LTA | – | 0.10 | 0.18 | 0.34 | .5627 |
| Intercept | | –0.54 | 2.32 | 0.05 | .8153 |

** Significant < .01. * Significant < .05.

Correct classification = 81.6%.[a]
$\chi^2 = 32.8$ (11 *df*).
$p = .0006$.

INC = net income/total assets.
CUR_RAT = current assets/current liabilities.
GEARING = long-term debt/total assets.
CASHTA = cash/total assets.
CATA = current assets/total assets.
CASALES = current assets/sales.
CFTL = cash flows from operations/total liabilities.
XNPAT = relative change in net profit from prior year.
LOSS_Y = number of loss years within the past three years.
LTA = logarithm of total assets.

[a] For all classification tests, equal weightings were given to type 1 and type 2 errors. Prior studies (e.g., Koh, 1992) have found that optimal cut-off points in failure prediction models are relatively insensitive to different relative misclassification costs.

### *Sensitivity Analyses*

To ensure that the results are robust, and in order to provide further details on the information content of MPCs, additional analyses were performed. These are outlined below.

First, in order to determine whether there was differential information content between the non-disclosure of MPCs and the disclosure of mixed or pessimistic comments, the analysis was reperformed using two dichotomous variables of interest (i.e., POS_F where 1 = optimistic MPC, and NEG_F where 1 = mixed or pessimistic MPC). No significant changes in the results were noted. While the POS_F variable remained significant ($p = .0203$), the non-significance of the NEG_F variable ($p = .6769$) in the logistic regression indicates that there is no significant difference in the likelihood of failure of financially distressed companies that did not disclose any MPCs and those that disclosed pessimistic or mixed MPCs. This finding, however, must be interpreted with caution due to the small number of companies (fourteen) disclosing pessimistic and mixed MPCs. Further analyses using MPCs partitioning between (a) optimistic versus pessimistic/mixed, and (b) optimistic versus non-disclosers, showed no significant differences in results. MPCs remained significant in both instances ($p = .0185$ and $p = .0155$, respectively).

Second, the analysis was reperformed using the non-winsorized data rather than the windsorized data set. The logistic regression results similarly identified MPCs as a significant predictor variable ($p = .0116$). The other (marginally) significant variable was CUR_RAT ($p = .0534$) and the overall classification rate was 82.4 per cent ($\chi^2 = 34.67$, 11 $df$, $p = .0017$).

Third, the MPCs variable remained significant ($p = .0216$) even with the inclusion of an audit opinion variable ($p = .0337$) as an additional independent variable into the model, where 1 signifies a going-concern qualification. Audit opinions were classified as going-concern qualifications in cases where the auditor issued a qualified opinion due to significant doubt about the ability of the company to continue as a going concern.[16] This result demonstrates that the MPCs still have incremental information content above that extracted by the auditor during their qualification process.

Fourth, the analysis was rerun using a cut-off for companies experiencing more than 20 per cent losses over total assets, rather than the 5 per cent reported in this article. MPCs ($p = .0079$) were still found to have significant incremental explanatory power. The model also became more significant ($\chi^2 = 41.81$, 11 $df$, $p = .00005$), with an overall classification rate of 89.2 per cent. Other significant variables included INC ($p = .0283$) and CASALES ($p = .0447$). This demonstrates that the results are not contingent on the initial cut-off rate of 5 per cent that was used to identify financially distressed companies.

Fifth, the analysis was rerun on observations that met stricter definitions of financial distress calculated from the Zmijewski (1984) model. Using the scores from this model, the analysis was rerun on the sixty-five companies that had a greater than 75 per cent probability of failure within one year. MPCs ($p = .018$) were still found to have significant incremental explanatory power. The model was significant ($\chi^2 = 29.27$, 11 $df$, $p = .0021$), with an overall classification rate of 79.0 per cent. CUR_RAT ($p = .009$) was the only other significant variable. The analysis was rerun on the ninety companies that had greater than a 50 per cent probability of failure within one year. MPCs ($p = .015$) remained significant. The model also remained significant ($\chi^2 = 28.59$, 11 $df$, $p = .0026$), with an overall classification rate of 80.5 per cent. CUR_RAT ($p = .025$) was the only other significant variable. Again this shows that the results are not affected by different degrees of financial distress.

---

[16] The data were collected in a period before the change in the auditing standards which required the audit report to include an explanatory paragraph instead of a qualified opinion when there was going-concern uncertainty.

The final sensitivity analysis consisted of undertaking the analysis using net loss before extraordinary items rather than after extraordinary items. This reduced the sample size to 134 companies using the 5 per cent loss cut-off. Again, the results were consistent with prior reported findings, with the only significant variables being MPCs ($p = .0109$) and the marginally significant CUR_RAT ($p = .0670$).

## CONCLUSIONS AND FUTURE RESEARCH

This is the first study to investigate the information content of MPCs disclosed in the annual reports of financially distressed companies. Consistent with prior findings that used random or matched samples of companies, the results indicate that MPCs have information content with respect to a company's future viability. This finding reduces some of the concerns that users who rely on the MD&A or the 'Other Information' sections in annual reports (see Lee and Tweedie, 1976; Bartlett and Chandler, 1995; Frost, 1997) may have regarding the reliability of MPCs for companies in financial distress.

The reliability of the published MPCs could be attributable to the fact that the auditor reviews the MPCs in considering their opinion on the financial statements. The auditing standards require auditors to ensure that the 'Other Information' attached to financial statements is not materially inconsistent with the financial statements, and does not contain any material misstatement of fact (AUS 212 [Australia]; SAS No. 8 [U.S.A.]; ISA 720 [International]). Other explanatory factors include costs of potential litigation and the loss of reputation that prevent management from disclosing misleading MPCs.

It was also observed here that, while financially distressed companies that did not disclose MPCs were significantly more likely to fail than companies disclosing optimistic MPCs, there was no difference in their likelihood of failure when compared with companies that disclosed mixed or pessimistic MPCs. This finding implies that financially distressed companies may omit MPCs from the annual report when they do not have optimistic MPCs to disclose. Even though the data were contextualized in an environment where companies were required by the Corporations Law to disclose expected future results, results imply that financially distressed companies were engaging in selective disclosures. The implication is that these companies are using the leeway given by the Corporations Law by choosing not to disclose MPCs that are deemed prejudicial to the company. Nevertheless, the non-disclosure of MPCs may in itself be considered informative to outsiders, as the non-disclosure may be interpreted as 'bad news'. This finding supports Darrough and Stoughton's (1990) theory of selective disclosure in the context of financial distress.

The results indicate that MPCs, being forward-looking in nature, are informative and provide additional information not found in financial ratios when they are used for assessing the going-concern viability of financially distressed companies. The significance of the MPC variable in conjunction with the relative lack of significance of the financial ratios in the model also implies that financial statement users of financially distressed companies might gain a better insight into a company's prospects by reading the MPCs in conjunction with the financial statements. While this analysis may alleviate concerns that MPCs of financially distressed companies are overly optimistic, further legislative action may be required to encourage full disclosure of both optimistic and pessimistic MPCs.

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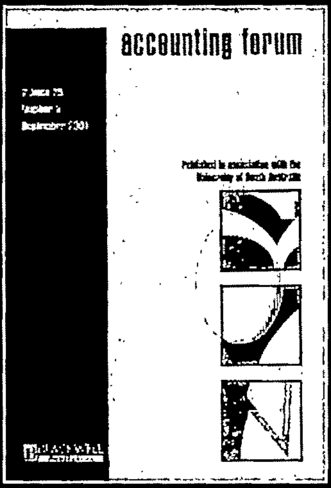

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# EDITORIAL

> What has been is what will be, and what has been done is what will be done; there is nothing new under the sun.
>
> —Attributed to King Solomon, Ecclesiastes, 1:9

Enron's massive, but more importantly, *unexpected* demise with concomitant claims of other companies having 'Enronitis' (earnings management malaise), the fiasco with WorldCom's alleged capitalization of costs over several years and Xerox's revenue reversals, also covering several years—and all involving billions of dollars in profit adjustments—justify recall of the headnote from the February 2002 Editorial.

The last two Editorials have lamented the brouhaha surrounding deficiencies in accounting and auditing practices in the U.S.A. and Australia. Revelations in the press of accounting irregularities seem to be nearly a daily occurrence, and this, coupled to their scale—asset write-downs, costs being capitalized rather than expensed in line with the matching principle, revenue reversals of sales that allegedly did not ever exist all highlight problems with accounting and auditing practices. Those particulars have undermined investor confidence and trust in the market's primary source of information, thereby putting a brake on major capital markets and on their associated real economies. Contiguously, they have sullied the reputation of accounting as a professional activity.

The current events should, however, in the longer term prove to be the catalyst for improving accounting thought and practice. Many myths should have been debunked by those sagas. Specifically, it should no longer automatically be accepted that U.S. accounting practices and Standards are necessarily superior to Europe's and other countries'. Nor that a regulatory system relying on a black-letter 'rules-based' regime is preferable to a 'principles-based' one, such as those relying on the true and fair view override. And further, there should be rejection of the proposition that managers be afforded unfettered discretion to determine appropriate accounting practices, as they necessarily are best placed to assess those choices.

The following business address captures many of those concerns:

## DIRECTORS, INVESTORS, AUDITORS AND THE LAW

There has been much uneasiness in many circles about the relationship between directors, investors, auditors and the law. Some of this hinges on the steps open to directors to favour themselves or others, allegedly at the expense of companies and investors in them. But the greater part of that uneasiness stems from the information available to, and made available by, companies.

Some of this is operational. If a leading retailer says it has opened ten new stores this is unlikely to affect that company's share price materially. If a listed mining company says it has obtained certain assays on samples drilled on its leases, this may influence the share price materially. The differences between reactions to investment and speculative opportunities is something that I shall return to.

Some of the information is financial: and this is the more commonly the focus of all parties. The law regulates it; the stock exchanges require it; auditors endorse it; investors and creditors rely on it; directors publish it. The law has made two classes of people—directors and auditors—responsible for it, in the interests of the investing and lending public. Similar laws rule in the U.S., Canada, U.K. and elsewhere. Because directors and auditors are legally responsible they have been, or are likely to be, open to stockholders' and creditors' suits when stockholders and creditors suffer losses which they claim have arisen from faulty information. How many such suits there have been over the last four years is unknown—but it was reported several years ago there were 100 suits pending against public accounting firms in the U.S. Recently there have been cries of anguish as the local companies legislation threatened to impose greater penalties on directors. I have some sympathy with this anguish.

If a company fails to satisfy the weights and measures laws, the food and beverage laws, the industrial and safety laws, it is the company which is held to be actionable. These laws are no less and no more for the benefit of third parties than the laws relating to corporate financial information. Yet we do not expect directors to be responsible for them, for technical detail, etc. There are professionally qualified people employed by companies to see to such details. We do not ever hold them to be actionable. The company is actionable.

Why is it different for financial information? The financial information required to be published is a summary of what has happened in the past and its result—the state of affairs. In principle this is all factual, capable of being put together by professionally qualified people. The object of its publication is to indicate what shareholders and creditors need to know about performance and status. The financial statements embrace the effects of so many details that directors can no more know whether the details are correct than whether all the food, drug, costs and measures laws are satisfied.

Why has responsibility been pinned on directors? Partly, I suspect, because of the laws against misrepresentation in prospectuses—and in that case I believe directors can properly be held to fair play. Partly, because we have not outgrown the ideal of the single-owner business, in which the owner can please himself about his accounts for the single owner can fool himself if he wants to put curious values on his assets and earnings. And partly, because accountants have fallen back on managers and directors for their own valuations of assets and consequently earnings.

Now this is curious. Financial statements are a basis for judgment of performance. How can performance be judged if those, whose performance is in question, determine the score? It is as if we allowed the runners in a race to nominate their own time and success. We require independent score keepers in all sorts of things, cricket, horse racing, field and track events—it seems as though these are all more important than business where the performers are scorers under the system of allowing managers to value assets and determine profits.

> Of course as a check, the law provides for auditors. But as long as managers and directors are allowed to assume the right to determine the score, auditors can provide no independent check.
>
> The upshot of this is that there are literally hundreds of thousands of ways of calculating net profit—there are no firm accounting rules—and investors and creditors are often the losers. The very devices which are expected to tell us how official business is are so blunt and flexible that they tell us little of the whole story. One American chairman recently said, 'Accounting tricks are taking over. There's no rule of how to keep the books.' You can make up your own mind and this in spite of the American SEC. This sloppiness can trick everybody, not only investors. A partner in [a leading U.K. merchant bank], commenting on some English takeovers a few years ago, said the management of companies themselves did not know how vulnerable their companies were because they themselves had no idea of the worth of their assets. If you watch the papers closely you will find time after time companies have changed their accounting methods and shown higher profits. It is difficult to escape the conclusion that the change in accounting is intended to mask the fact that profits have really fallen, or that what was previously reported was improper—not a true and fair view as the law requires.
>
> This must mean there is a vast amount of undisclosed information because of the laxity of the rules. And directors may well be concerned about what may happen if stockholders and creditors en masse were to bring actions for the publication of misleading information, and if higher penalties are introduced by Statute.
>
> There seems to be only one way to do justice to all concerned. It involves several steps. First, the production of financial information must be regarded as a technical job; directors and managers can only be relieved of responsibility if they have no, or at most a nominal influence on the figures. But second, the technical job must be done better. If accountants themselves will not change the methods of accounting, in the interests of the investing public and an orderly market in securities, the law must step in. If the technical job were more effective it would then be proper to settle responsibility on directors. Third, if the job of accounting produced up-to-date data auditors could independently check them, and true and fair could mean something definite.
>
> Finally, I do not believe piecemeal additions to disclosure through the law is a satisfactory solution—for it goes on presuming directors can have the specific knowledge of thousands of details they cannot possibly have. But if directors wish to be free of liability they will have to forgo the privilege of disclosing what they please when they please. We can only expect law to be fair to directors and auditors if what they report is fair to investors and creditors.

The sting in the tail of this address is that it was delivered by the iconoclastic Ray Chambers on 19 January 1971 to Sydney Rotary. It championed the need for more than just tinkerings to the combined self/government regulatory system. Piecemeal adjustments had been the norm over several decades and would continue to be so for the following thirty years. Chambers perceived that systemic changes to the accounting system were needed for there to be an informed securities market. Those changes are equally necessary today. But the signs are that piecemeal reforms will again be the likely outcome of the professional and regulatory inquiries currently in process. If so, then again that will be an opportunity lost.

The academic and practitioner arms of the profession have crucial roles in ensuring that the purported products of the previous and current regulatory reforms are properly evaluated. This is necessary if the profession is to retain its place amongst the other learned disciplines in the academy. Only then will what

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STUART MCLEAY AND DUARTE TRIGUEIROS

# Proportionate Growth and the Theoretical Foundations of Financial Ratios

The article proposes a theoretical framework for understanding financial ratios, showing that the multiplicative character of the financial variables from which financial ratios are constructed is a necessary condition of valid ratio usage, not just an assumption supported by evidence. Also, by assuming that firm size is a measurable statistical effect, the article offers an informed reappraisal of the limitations of financial ratios, particularly the well-known limitation of proportionality. The article is divided into two parts, one where ratio components are viewed as deterministic variables and the other where they are random. Such an approach allows the characteristics of ratios to be more easily understood before generalizing the relationship between ratio components to encompass randomness. In the second part, when variability introduced by firm size is treated as a random effect, it is shown that if the accounting variables Y and X used to calculate a financial ratio Y/X are exponential Brownian motion, and if continuous growth rates are equal and proportionate to firm size, this may lead to ratios which are asymmetric but which do not necessarily drift.

**Key words:** Accounting; Ratio analysis; Theory.

Accounting academics have often considered the widespread use of ratios in financial analysis as somewhat intriguing. Indeed, in one of the earliest contributions to this topic in the accounting research literature, Horrigan (1965) remarked that financial ratios were referred to in textbooks in almost apologetic tones as though their expected utility was extremely low. Horrigan's response to this situation, however, was to seek to dissipate such doubts by describing the statistical characteristics of some widely used ratios in order to demonstrate that they may be useful after all.

Following Horrigan's optimistic review, subsequent empirical research revealed some promising applications of financial ratio analysis (e.g., Beaver, 1966; Altman, 1968). A few years later, however, the scepticism returned, with authors such as Deakin (1976) noticing that the empirical frequency distributions of financial ratios appear to vary widely and, as a result, questioning the validity of analytical methods that assume the normality of ratio data. This prompted Frecka and Hopwood (1983) and others to propose *ad hoc* techniques such as transformation and the trimming or winsorizing of outliers to deal with the unduly influential values

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present in samples of financial ratios, techniques which reflected the apparently widespread belief that there are no general rules underpinning the ratio method.

Adding to the growing doubt concerning the validity of financial ratio analysis, Lev and Sunder (1979) raised some fundamental questions as to whether the use of ratios is motivated by well-founded considerations or whether, in contrast, it is merely a routine. They claimed that almost all of the assumptions required for valid ratio analysis are likely to be violated in practice. In a more specific critique, Whittington (1980) discussed in detail how ratios may not be up to the task. Both Lev and Sunder (1979) and Whittington (1980) stressed that valid measurement using ratios requires proportionality between the components (i.e., $Y = bX$). Since such an assumption seems to be too restrictive, these authors advocated a two parameter regression model ($Y = a + bX$), or similar functional form, rather than the single parameter ratio model. Barnes (1982) went further, suggesting that nonproportionality is also the source of the excessive skewness often found in the frequency distributions of ratios, and that the use of regressions instead of ratios should eliminate both the problem of nonproportionality and that of skewness in distributions. The prevailing scepticism about the usefulness of ratios deepened further when Tippett (1990) claimed that ratios used as norms or benchmarks for interfirm comparison are intrinsically unstable, drifting upwards or downwards over time.

A striking feature of the above-mentioned research is the small impact it has had, both on the practice of financial analysis and in the way empirical research is carried out. One reason for this may be that researchers presuppose that accounting data used in the computation of financial ratios is a special case, too complex for simple, unifying explanations. As a consequence, empirical research concerning financial ratios lacks the level of definition that is required to make the specific assumptions that are needed to draw appropriate inferences. For example, in spite of the insistence that financial ratios fail to remove the effect of firm size from the financial measurement, to date the literature on ratio analysis has not produced a definition of 'size' itself.

In an earlier attempt to base ratio models on broader assumptions, it was demonstrated that a fuller understanding of financial ratios can be achieved by taking account of the behaviour of the two variables from which a financial ratio is constructed, particularly where firm size plays an important part, and some limiting case theoretical ratio models that allow for exponential growth in accounting variables were identified (McLeay, 1986a, 1986b). Further attempts at normalizing observed ratios through transformation led to the conclusion that better defined ratio models are required (Ezzamel and Mar-Molinero, 1990). Subsequently, Trigueiros (1995) offered a simple explanation for the diversity of distributions found in ratios. While providing empirical evidence that the accounting variables used to calculate financial ratios follow a multiplicative rather than an additive law of probabilities, Trigueiros pointed out that such behaviour suggests the existence of a statistical effect that is common to all of the figures reported in a particular set of accounts but which varies both through time and across firms.

In this article, it is shown that the multiplicative behaviour of ratio components is not just a reasonable assumption supported by empirical observation, but is a prerequisite of valid ratio usage. Furthermore, by also assuming that firm size is a measurable statistical effect, the paper is able to offer a more focused discussion of the limitations of financial ratios, thus adding to our understanding of financial ratios and their potential use.

## THE VALIDITY OF RATIOS

Financial analysis is just one of many tasks where ratios are used. There are numerous applications where the usefulness of ratios is evident, such as maps and scaled models that are governed by a ratio or scale that measures the number of times the representation is smaller than reality.[1] Many of the ratios used in financial analysis are similar to scales: interest cover, for instance, is the number of times earnings is greater than interest; the liquidity ratio is the number of times liquid assets exceeds current liabilities; the sales margin expresses earnings, the numerator, as a fraction of sales, the denominator; and so on.[2]

The similarity with scales may also help to understand why financial ratios may be invalid. Scales are arbitrary proportions, chosen before the actual drawing of a scaled representation such as a map takes place. As such, they are neither valid nor invalid. Financial ratios, by contrast, are supposed to represent some pre-existing reality, namely the natural relationship between the numerator and the denominator of the ratio. To the extent that ratios are models of an underlying reality, they may be invalid if the natural relationship between the numerator and the denominator, although pre-supposed to be a simple scale, actually cannot be so.

The traditional approach is to question the validity of financial ratios on these grounds, that is, that a scaling factor between the numerator and the denominator of the ratio may not exist. Unfortunately, rather than investigating just the existence or not of scaling factors, most of the extant literature has adopted the more stringent stance of evaluating models in which the scaling factor is also an *expected* ratio. This additional requirement is unduly restrictive, and is implicit for example when financial ratios are described using statistical models of the additive type.[3] In order to circumvent the drawbacks associated with the *a priori* use of particular models, this section first derives the natural form of proportionality, from which it is possible to obtain a better understanding of the scaling factor. Then, the nature of firm size is discussed and it is shown how size is removed from the financial measurement. Finally, it is also shown that ratios are valid only where size evolves exponentially.

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[1] Speed, flow and pressure can also be considered as ratios, measuring the average change in one variable (the numerator of the ratio) per unit change in another variable (the denominator). A derivative, that is, a rate of change, is also a ratio, in this case a ratio of two small changes. Logarithms also perform a task similar to that of ratios, as measurement on a logarithmic scale is a rate of change. For example, in logarithms, a change from 1 million to 2 million is the same as a change from 1 billion to 2 billion, the logarithmic rate of change expressing the fact that, in both cases, the second observation is twice as large as the first. Unfortunately, an influential fallacy concerning logarithms was introduced by Eisenbeis (1977) in his oft-cited exposition of certain pitfalls in discriminant ratio analysis: 'log-transformed variables give less weight to equal percentage changes in a variable where the values are large than when they are smaller ... the implications would be that one does not believe that there is as much difference between a $1 billion and a $2 billion size firms as there is between a $1 million and a $2 million size firms. The percentage difference in the log will be greater in the latter than in the former case' (p. 877).

[2] As with scales, the components of many financial ratios are measured in the same unit, money in this case. In the ratio, as in the scale, the original units of measurement are no longer present. A sales margin of 16 per cent, for example, is a percentage with no units attached. Where the unit in which the numerator of a ratio is measured differs from that of the denominator, ratios may retain both units as in the case of earnings per share, or assume another, as in the case of number of days sales in debtors.

*Scale Invariance*

When a ratio is used for the purposes of scaling, the implicit assumption is that the relationship between the numerator and the denominator should remain constant no matter what changes are observed in the ratio components, that is,

$$\frac{Y}{X} = \text{Constant.}$$

For instance, the once popular benchmark of 2:1 for the current ratio is deemed to hold whether the figures involved for current assets and current liabilities are as large as \$2bn:\$1bn or as small as \$200:\$100. It is this that prompted authors such as Lev and Sunder (1979) and Whittington (1980) to state that the most basic requirement of ratio validity is proportionality between $Y$ and $X$ and to examine the two characteristics of the proportional relationship, namely linearity and a zero intercept.[4]

As we show below, however, these characteristics do not provide the most general description of proportionality. In particular, it may be noticed that the above emphasizes the relationship between $Y$ and $X$ but not the way in which changes in $Y$ should relate to changes in $X$ so that the ratio remains constant. Yet a thorough understanding of ratios requires this dynamic approach. It is obvious that, when $Y$ is proportional to $X$, the rate of change of $Y$ with respect to $X$ remains constant and similar to the ratio itself. For ratios to be valid, therefore, the following relationship must hold:

$$\frac{Y}{X} = \frac{dY}{dX}$$

---

[3] Additive statistical models, which are by far the most frequently used models, add together effects such as the expectation, co-variances and a random term that is assumed to be normally distributed.

[4] It is worth emphasizing that our concern is with ratios, where scaling takes place. Some financial indicators can be viewed as fundamental magnitudes in their own right. For instance, return on assets may proxy the internal rate of return. In such cases an expectation may be modelled in a manner other than the financial ratio, the issue of the validity of the ratio method not applying in such circumstances.

where $dY$, $dX$ are any related changes observed in $Y$ and $X$. This is the differential equivalent to $Y/X$ = Constant. It fully encompasses the traditional definition of ratio validity and has the important advantage of making explicit the general requirement of proportionality. In fact, by rearranging terms, the above becomes

$$\frac{dY}{Y} = \frac{dX}{X} \tag{1}$$

Equality (1) shows that the general condition of proportionality is *scale invariance*, whereby the relative change in $Y$ should be equal to the relative change in $X$. It will be seen below that, besides scale invariance, the validity of ratios also requires that each of the variables $Y$ and $X$ follows a *multiplicative process*, that is, one of exponential change. From these new conditions, which are discussed in greater detail below, it is possible to infer the role of firm size in financial ratios.

### *Scale Invariance and Firm Size*

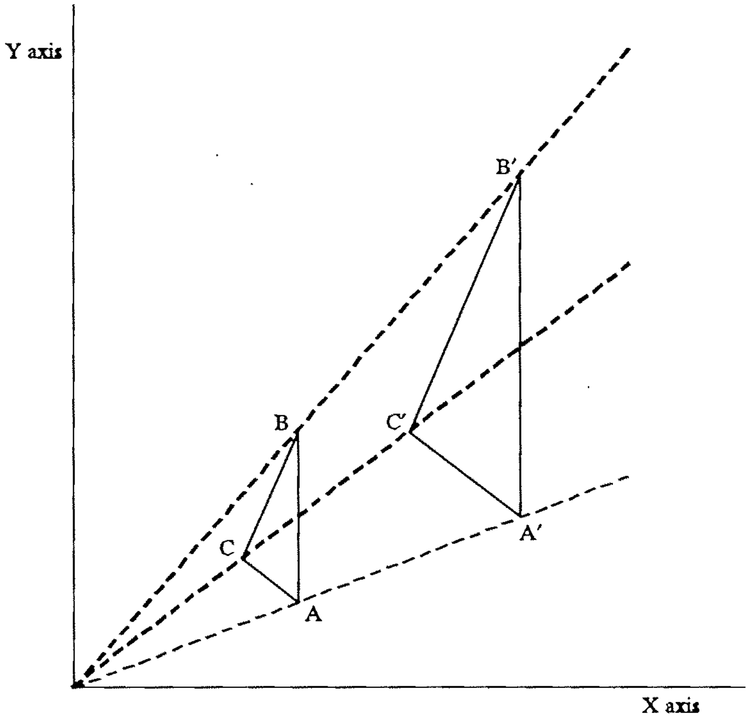
As mentioned above, (1) shows that ratios are valid only if the relative changes in the numerator and denominator are expected to be similar. For instance, when comparing firms in cross-section, if the current assets figure is expected to be many times larger in one firm than in another then this should also apply to current liabilities or any other variable that is potentially useful as a component of a ratio. Similarly, in a time series analysis, (1) implies that variables eligible as the components of a ratio are predicted to grow at the same rate. If, say, sales is predicted to grow by 12 per cent in a given year, then scale invariance requires that earnings should also grow by 12 per cent during the year. It is important to note that (1) describes a mechanism, not observed values. So long as the mechanism underlying reported numbers predicts that $dY/Y$ is similar to $dX/X$, proportionality is verified irrespective of the actual changes in $Y$ and $X$. Indeed, without presupposing scale invariance, it would be impossible to arrive at any reliable conclusion about the financial characteristics of firms using ratio analysis. For example, unless it is postulated that relative changes are the same for current assets and current liabilities across firms of different sizes, it would not be possible to infer whether a current ratio above the norm in a large firm is attributable to the liquidity of that particular firm, or is just a characteristic of large firms.

It should not be surprising that the validity of ratios is conditional on the equality of relative changes in variables. Since ratios are scales, they are valid only where the scaling of the data makes sense and this implies *scale invariance* as a property of such data.

Figure 1 provides an intuitive description of scale invariance, where the triangle $ABC$ is scaled up by a factor of 2. Scale invariant changes such as those leading from $ABC$ to its image $A'B'C'$ require that vectors $[X_A, Y_A]$, $[X_B, Y_B]$ and $[X_C, Y_C]$ obey the same law of growth, a law generating changes of equal proportion in each vector as in equality (1). Similarly, scale invariance implies that each of the different items reported in a set of accounts will be influenced jointly by the same effect, and firm size is the most obvious such effect that all of the items reported

FIGURE 1

AN EXAMPLE OF SCALE-INVARIANCE (ABC : A′B′C′)



by a firm at a particular point in time will have in common.[5] Thus, it is reasonable to suppose that relative changes in these variables will reflect, *inter alia*, differences in the size of firms or, in a time series context, the growth rate of the firm.

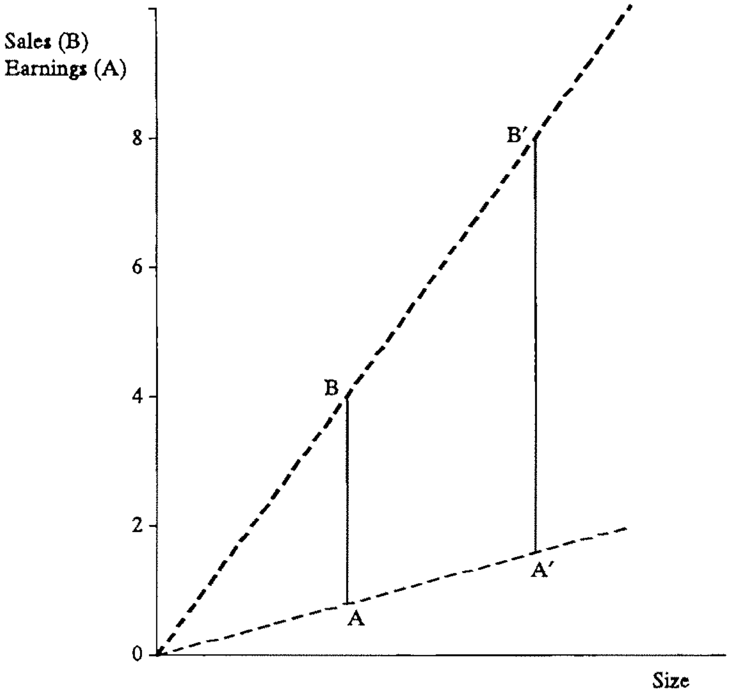
Figure 2 shows how differences in firm size relate to the magnitude of ratio components under the condition of scale invariance illustrated in the previous figure. Suppose that the $X$-axis now measures firm size and the $Y$-axis is allowed to represent sales and earnings. Each accounting variable is now modelled as a specific *scale to size* that is characteristic of the variable (which, in this example, is $Y_B/X_B = Y_{B'}/X_{B'} = 4$ for sales and $Y_A/X_A = Y_{A'}/X_{A'} = 0.2$ for earnings), multiplied by the common effect of size. That is,

---

[5] Not only is it an empirical fact that the financial statements of large firms contain reported numbers that are many orders of magnitude larger than those in the accounts of small firms, there are also compelling economic reasons to support the conviction that each firm's actual size greatly influences the overall magnitude of numbers reported in its accounts. Indeed, if variables such as sales or earnings were not closely related to size, then profitability and dividend yield would be diluted by any increase in size and firms would carefully avoid growing.

FIGURE 2

SCALE TO SIZE FOR EARNINGS (AA′) AND SALES (BB′)



$$\text{Earnings} = 0.2 \times \text{Size} \quad \text{and} \quad \text{Sales} = 4 \times \text{Size}$$

The natural scale between earnings and sales (5 per cent) is given by the division of the two scales to size involved, that is, 0.2 + 4. This value of 5 per cent is thus the ratio norm, which is used to benchmark comparisons across firms or through time. It is because the same size multiplier is present in both components of the ratio, although differently scaled, that removal of the size effect may take place.

It may be concluded that proportionality leads directly to the modelling of accounting variables used in ratios, not as an addition of effects, but as the product of a constant scale by a size factor. Moreover, proportionality is verified no matter the actual behaviour of this size factor. This suggests the need to consider another condition of valid ratio analysis, not just proportionality but also the way in which firm size changes.

### *Multiplicative Processes*

The way a *change* in a variable relates to its *level* is an important consideration. This is because any increase or decrease must occur in such a way that relative changes in the variable remain constant, otherwise such changes would be size dependent and this would render ratios incomparable across firms of different sizes. Specifically, for a given financial indicator, the likelihood of observing a discrepancy of, say, 1 per cent in relation to the norm, must be the same for all firms, whether small or large. A second condition of valid ratio analysis is therefore homoscedasticity: the distribution of the ratio must be independent of size.

In order to illustrate the practical consequences of this new condition, it is necessary to model not just changes in accounting variables but their joint evolution under the influence of firm size. To this effect, a suitable variable $\tau$ is now introduced, and the mechanism that drives relative changes in $Y$ and $X$ is written as

$$\frac{dY}{Y} = s_y d\tau \quad\text{and}\quad \frac{dX}{X} = s_x d\tau$$

where $s_y$, $s_x$ must be strictly independent of $Y$, $X$ respectively so that the second condition, that of homoscedasticity, is satisfied. This is better known as the 'Law of Proportionate Effect' or 'Gibrat's Law', the source of the family of multiplicative processes mentioned earlier where relative changes observed in $Y$ and $X$ must be homogeneous (Gibrat, [1931] 1957). Variables evolving exponentially with $\tau$, such as

$$Y = Y_0 e^{s_y\tau} \quad\text{and}\quad X = X_0 e^{s_x\tau} \qquad (2)$$

are the simplest instance, $Y_0$, $X_0$ being arbitrary constant magnitudes in this case. Furthermore, the condition of scale invariance is satisified where $s_y = s_x$.[6]

Table 1 compares the case where size is an exponential function of $\tau$ with the alternative where changes in size are linear. Once again, sales is four times size and earnings is one-fifth of size, the natural scale between earnings and sales being 5 per cent. The table shows how ratios that are proportional may nevertheless exhibit relative changes in $Y$ and $X$ that are correlated with size. When changes in size are linear (see Panel 1), the smallest firm illustrated maintains its level of profitability whilst increasing its sales and earnings by 1 per cent, whereas this increase is only 0.75 per cent in the case of the largest firm. On the other hand, any firm keeping its sales margin at a constant level of 5 per cent whilst sales and earnings grow steadily by 1 per cent (see Panel 2) would, *ipso facto*, exhibit exponential growth not linear growth. Whilst in both cases the relationship between the numerator and the denominator of the ratio is exactly the same straight line with a zero intercept, it is only when the changes in $Y$ and $X$ are governed by a multiplicative process that the ratio may be interpreted independently of firm size.

Whereas the first of the conditions introduced in this paper (scale invariance) demands a specific type of relationship between components, that is, that relative changes in the ratio components will be the same for the numerator $Y$ and

---

[6] Notice that whereas (1) equates the two effective rates of change $dY/Y$ and $dX/X$, (3) is based on $e^{s_y\tau}$ and $e^{s_x\tau}$ which are continuous rates. The relationship between an effective rate of change, $r$, and the underlying continuous rate of change $s$ is $s = \log(r + 1)$.

TABLE 1

LINEAR AND EXPONENTIAL GROWTH IN RATIO COMPONENTS

**Panel 1: Linear changes in size (the ratio $Y/X$ is a constant 5% but the relative changes in $X$ and $Y$ are correlated with size)**

| $\tau$ | Size | Earnings ($Y$) = 0.2 × Size | Sales ($X$) = 4 × Size | $Y/X$ | $dY/Y$ | $dX/X$ |
|---|---|---|---|---|---|---|
| 0 | 100 | 20.0 | 400 | 5% | | |
| 1 | 101 | 20.2 | 404 | 5% | 0.0100 | 0.0100 |
| 2 | 102 | 20.4 | 408 | 5% | 0.0099 | 0.0099 |
| ... | | | | | | |
| 32 | 132 | 26.4 | 528 | 5% | 0.0076 | 0.0076 |
| 33 | 133 | 26.6 | 532 | 5% | 0.0075 | 0.0075 |

**Panel 2: Exponential changes in size (the ratio $Y/X$ is a constant 5% but the relative changes in $X$ and $Y$ are independent of size)**

| $\tau$ | Size | Earnings ($Y$) = 0.2 × Size | Sales ($X$) = 4 × Size | $Y/X$ | $dY/Y$ | $dX/X$ |
|---|---|---|---|---|---|---|
| 0 | 100.00 | 20.000 | 400.00 | 5% | | |
| 1 | 101.00 | 20.201 | 404.02 | 5% | 0.0100 | 0.0100 |
| 2 | 102.02 | 20.404 | 408.08 | 5% | 0.0100 | 0.0100 |
| ... | | | | | | |
| 32 | 137.71 | 27.543 | 550.85 | 5% | 0.0100 | 0.0100 |
| 33 | 139.09 | 27.819 | 556.38 | 5% | 0.0100 | 0.0100 |

denominator $X$, the second condition (the law of proportionate effect) is a constraint that is placed separately on the individual ratio components whereby a relative change in $Y$ will be independent of the actual value of $Y$ and a relative change in $X$ will be independent of the actual value of $X$. Since ratios are used in two clearly distinct modes of analysis (time series and cross-section), the interpretation of (2) will vary accordingly. Its application in these different contexts (i.e., for either trend analysis or interfirm comparison) is illustrated below.

### *A Time Series Example*

In a time series context, the interpretation of processes such as (2) is straightforward, $\tau$ representing a time sequence starting when $Y = Y_0$, $X = X_0$. These initial values should be viewed as reflecting the initial size of the firm, each variable being scaled differently to size. Furthermore, $s_y$, $s_x$ are real growth rates observed in $Y$, $X$. Although these growth rates may vary with time, by fluctuating randomly around a constant mean for example, they are expected at any one moment in time to be equal for different variables (i.e., $s_y = s_x = s$) since they reflect proportionate changes in the size of the firm.

Deviations observed in $s_y$ or $s_x$ in relation to the growth rate $s$ may be expressed as a difference $n_y = s - s_y$ or $n_x = s - s_x$. Suppose that, in a given year, the sales figure is reported as $1,000 and earnings as $100, then profitability is 10 per cent. If sales grows by $s$ (the same as the firm) but earnings grows by only $s - n$, then, in the following year,

$$\text{Earnings} = 100e^{(s-n)\tau} = 100e^{s\tau}e^{-n\tau} \quad \text{and} \quad \text{Sales} = 1000e^{s\tau}$$

and the ratio decreases by $e^{-n\tau}$. Not only is the ratio insensitive to the magnitudes of sales and earnings in the previous year, it is also insensitive to the growth rate $s$. The second condition of the valid ratio method is thus satisfied since the sales margin remains comparable, however low or high the growth of the firm may be.[7]

*A Cross-Sectional Example*

In cross-sectional analysis, an intuitive meaning may also be given to $s$ and $\tau$. In this case, $\tau$ measures the dispersion of size. Industries where firms range from the very small to the very large exhibit high $\tau$ whereas those where size is homogeneous exhibit low $\tau$. Accordingly, $s_y$ and $s_x$ are the distance between the realization $Y$ or $X$ and the corresponding median $Y_0$ or $X_0$. As in the previous example, observed $s_y$ and $s_x$ may differ but they should be viewed as realizations of a common, underlying $s$ so that the condition of scale invariance is satisfied.[8]

The ratio of the medians $Y_0/X_0$ is the natural scaling factor between $Y$ and $X$. If, for example, the median sales in a given industry is $1,000 and for earnings it is $100, whereas for firm A both sales and earnings are $s$ standard deviations from the norm, then

$$\text{Earnings}_A = 100e^{s\tau} \quad \text{and} \quad \text{Sales}_A = 1000e^{s\tau}.$$

Now consider firm B which is more profitable, the same volume of sales generating earnings $n$ standard deviations above the norm, that is,

$$\text{Earnings}_B = 100e^{(s+n)\tau} = \text{Earnings}_A e^{n\tau} \quad \text{and} \quad \text{Sales}_B = \text{Sales}_A.$$

The difference in profitability between B and A, which is shown above to be $e^{n\tau}$, is independent of $s$.[9] With multiplicative processes such as (2) governing accounting variables, ratios are comparable across firms however small or large they may be.[10] Not only is the ratio independent from the magnitudes of its components, differences in profitability are also size independent as required by the second condition.

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[7] Under sustained conditions, the ratio decreases by $e^{-n}$ over one year, by $e^{-2n}$ over two years, and so on. Since this effect accrues over time, comparisons using periods of different lengths are possible.

[8] In fact, the role of $\tau$ is similar in both cross-section and time-series analysis, allowing for comparison between cases where the time period or the dispersion are not the same.

[9] The increment in the ratio, $e^{n\tau}$, is also independent of the industry norms, $Y_0$, $X_0$. Indeed, from the practical viewpoint, independence from industry norms, initial values, targets, benchmarks and so on should be regarded as an important condition of ratio validity, as practitioners make decisions based on measurement of deviation from these norms.

*Negative Values*

A further issue that should be addressed at this point concerns the way in which negative values should be treated. In the case discussed earlier, where two multiplicative variables $Y$ and $X$ form the ratio $Y/X$, the ratio itself will take positive values only. This is the situation with the current ratio, for instance. Yet it is obvious that certain other ratios, such as return on sales, permit negative as well as positive values.

The problem of negative values in ratios may, in general, be avoided by transforming $Y/X$. Indeed, as most accounting variables are governed by relatively simple accounting identities, many financial ratios can be expressed by rearranging $Y$ and $X$. For instance, as earnings may be represented as $X - Y$, where $Y$ represents sales and $X$ represents total costs, then the ratio $r$ (return on sales, in this case) is equivalent to $(X - Y)/X$, or $1 - Y/X$. Similarly, where total assets is identical to the sum of equity capital and total liabilities, the liabilities ratios would be defined as $r = X/(Y + X)$, or $(1 + Y/X)^{-1}$. Table 2 shows how the meaningful rearrangement of $Y$ and $X$ leads to a set of ratios encompassing the classes most commonly observed in practice, each a function of $Y/X$.

*Some Limitations*

It has been argued above that linearity and a zero intercept are not sufficient to ensure valid ratios, but that a scale invariant, homogeneous process governing changes in ratio components is also required. In this context, it would seem that the most obvious characteristics of accounting data that may limit the use of ratios as valid measures of financial interrelationships are:

*The presence of a constant term,* such as fixed costs, which creates nonproportionality between the components of ratios, thus invalidating (1). This is a well-known limitation, generally presented as the main challenge to the valid use of financial ratios. In Figure 3, the proportionality between earnings and sales shown in Plot I can be compared with the effect of deducting a small constant term from earnings in Plot II. This is a local distortion having a significant effect only on those values in the region of the constant.

*The presence of factors which prevent accounting variables from changing at similar rates*, thus leading to ratio nonlinearities. Plot III of Figure 3 shows the effect of

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[10] Note that nonmultiplicative processes lead not only to size-dependent but also to norm-dependent ratios. Where realizations are proportional to size (e.g., Earnings = $4s\tau$ and Sales = $40s\tau$), such processes will satisfy the two 'traditional' conditions of ratio validity, linearity and a zero intercept, as shown in Table 1. Moreover, they will also obey (1), at least if $\tau$ is not allowed to approach zero. However, deviations in the ratio will be influenced not only by the size $s\tau$ but also by the natural scale of 10 per cent (i.e., $4s\tau/40s\tau$), a gain $d\tau = n$ in earnings, for instance, increasing the ratio by 10 per cent $n/s\tau$.

TABLE 2

CLASSES OF FINANCIAL RATIO

| Ratios | Transformation | Boundaries | Examples | |
|---|---|---|---|---|
| $\frac{Y}{X}$ | $r$ | 0, ∞ | Current ratio | $\frac{\text{Current assets}}{\text{Current liabilities}}$ |
| $\frac{X-Y}{X}$ | $1-r$ | −∞, 1 | Sales margin | $\frac{\text{Sales} - \text{Costs}}{\text{Sales}}$ |
| $\frac{Y-X}{X}$ | $r-1$ | −1, ∞ | Change in capital employed | $\frac{\text{Closing capital} - \text{Opening capital}}{\text{Opening capital}}$ |
| $\frac{Y+X}{X}$ | $1+r$ | 1, ∞ | Interest cover | $\frac{\text{Earnings} + \text{Interest paid}}{\text{Earnings}}$ |
| $\frac{X}{Y+X}$ | $\frac{1}{r}-1$ | 0, 1 | Liabilities ratio | $\frac{\text{Liabilities}}{\text{Equity} + \text{Liabilities}}$ |
| $\frac{X}{Y-X}$ | $1+\frac{1}{r}$ | 0, ∞ | Financial leverage ratio | $\frac{\text{Liabilities}}{\text{Total capital} - \text{Liabilities}}$ |

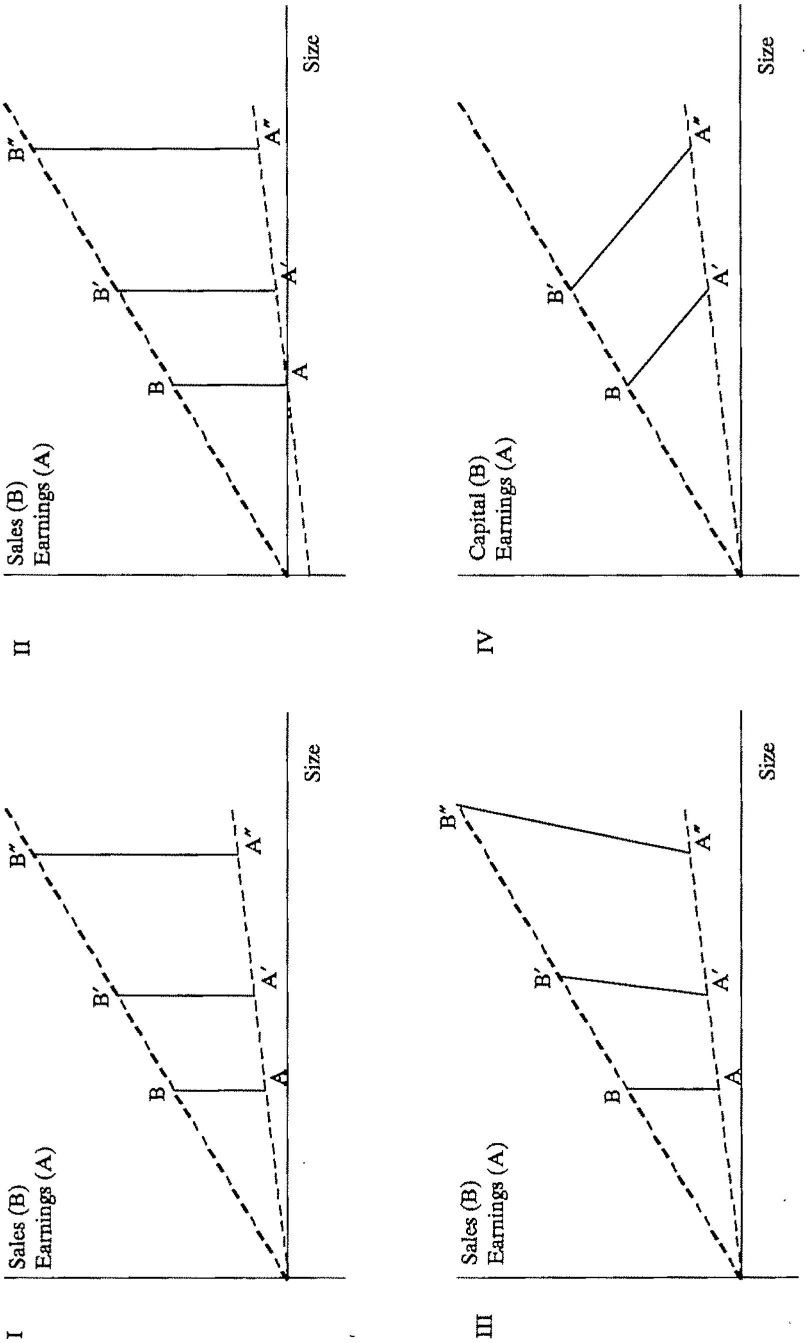
factors that have a differential impact on the two components of a ratio. In this example, sales now grows faster than earnings—or, in the cross-sectional context, increases disproportionately from one firm to another in the face of the diseconomies of scale discussed in Whittington (1980)—and the ratio decreases with size. This is potentially far more serious than the effect of a constant term. Even small differences between rates of change can introduce into the ratio an exponential correlation with size.

*The use of lagged ratio components*, where the numerator and denominator are not taken from the accounts for the same period and, therefore, where the effect of size is not removed because the same measure of size is not present in both components of the ratio. Specifically, each case will exhibit a displacement relative to the natural scale and proportional to the firm's actual rate of growth. Plot IV of Figure 3 depicts the influence of a lagged denominator, where the ratio of earnings to capital (a ratio for which it is usual to take the denominator from the previous year's financial report) is stable provided that growth is also stable, with the ratio suffering a constant displacement in proportion to such growth.

Figure 3 provides yet another reason for considering that linearity and a zero intercept are not sufficient conditions for valid ratios. Where, given these two conditions, the chords $AB$, $A'B'$ and $A''B''$ are parallel with each other, then the ratio is constant. However, as shown by comparing Plot IV with Plot I, this does not necessarily remove the effect of size. Only where the chords are perpendicular to the $X$-axis are the ratio components scaled to the same measure of size, and only then can the ratio measurement be described as size independent.

FIGURE 3

I: SCALE-INVARIANCE; II: ADDITIVE TERMS; III: DIFFERENCES IN PROPORTIONATE GROWTH; AND IV: LAGGED DENOMINATORS



## RATIOS OF RANDOM VARIABLES

When considering the statistical properties of financial ratios, most authors have assumed that the difficulties posed by their atypical behaviour are caused by distortions of normality. However, financial ratios cannot be described as resulting from the kind of additive stochastic process that underlies normal variables. Indeed, the same can be said for the accounting variables from which financial ratios are constructed, given the nature of the double-entry bookkeeping system that is based on aggregation of like transactions. As with many other economic phenomena such as wealth and the size of firms, the amount that is reported for a financial statement item is generated by a multiplicative rather than an additive law of probabilities. That is, whilst each transaction adding to the amount reported as, say, total sales can be modelled as a random event, the transaction contributes to the reported aggregate not in a manner that could lead to either an increase or decrease in total sales, but by accumulation only. Such accumulations of random events are described as multiplicative, as opposed to additive, because their likelihood is conditional on the occurrence of a chain of prior events, and stems therefore from the product rather than the sum of the individual probabilities.[11]

### *Characteristics of Multiplicative Variables*

Multiplicative variables tend to be lognormally rather than normally distributed. Thus, they cannot be treated as distortions of normality. No distorting mechanism would be able to create, from additive events, the wide range of values generally found in multiplicative variables. For instance, the larger values observed in a lognormal sample are likely to be many times greater than the median. Such extreme proportions have no counterpart in additive variables where the likelihood of observations two or three standard deviations above or below the mean is very small.[12]

When the multiplicative character of accounting data is ignored, features of the data that would otherwise be considered as commonplace (such as positive skewness and extreme values) are likely to be seen as extraordinary. In fact, the presence of so-called outliers in empirical ratio frequencies is most likely to be a consequence of multiplicative skewness in ratio components.[13] Given that such observations are not unusual in financial ratio samples, the technique of trimming or outlier deletion advocated by authors such as Frecka and Hopwood (1983) is a questionable practice. In fact, since the mechanism commanding the emergence of extreme values holds when the scale differs, and as trimming is in some respects equivalent to a reduction in scale, it will be found that the exclusion of one extreme value merely leads to its replacement by another extreme value on the reduced scale.[14]

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[11] The same issues arise in modelling count data, where the transition from one state to the next may be described as a multiplicative process. Statistical models based on counting processes, including a number of applications of the multiplicative intensity model, are discussed in Andersen *et al.* (1993).

[12] Details concerning the density of the bivariate lognormal distribution can be found in Johnson (1987). Lognormality in variables such as sales, earnings and assets, received a great deal of attention in texts on the theory of the growth of firms. In the accounting literature, McLeay (1986a) assumes lognormality in variables that are sums of similar transactions with the same sign such as stocks, creditors or current assets and McLeay (1997) considers this further, showing that two lognormal variables forming the ratio $X/(Y + X)$ have a logistic distribution which is found to give a good fit to observed frequencies of financial ratios of this form. Other empirical evidence (Trigueiros, 1995; Sudarsanam and Taffler, 1995) suggests that lognormality of the accounting variables used in calculating financial ratios is widespread.

### *The Random Effect of Size*

A further reason why it is important to assume the correct type of statistical behaviour is that adequate descriptions of the interrelationships amongst variables differ between additive and multiplicative variables. For additive data, it is assumed implicitly that distributions are preserved when variables are added or subtracted. This is not the case for multiplicative data where distributions are preserved when variables are multiplied or divided. For example, the simplest additive formulation is $x = \mu + z$, where $x$ is equal to an expected value, $\mu$, plus a random deviation, $z$. The multiplicative equivalent would be $x = x_0 f$, where a realization of $x$ is explained by the pre-specified level, $x_0$, multiplied by a random factor $f$ specific to each case.

When an additive variable $x$ is explained not only by an expected value, $\mu$, but also by $\delta_j$, an extra component of the variance of $x$, then $x_j = \mu + \delta_j + z$, where $\delta_j$ is the expected deviation from $\mu$ introduced by the $j^{\text{th}}$ level of $\delta$. If the same $\delta_j$ is present in two variables, $y$ and $x$, it is possible to remove it from measurement by subtracting variables. For instance, when a medical trial is carried out in the same group of patients both before and after treatment, the difference between observations $y$ and $x$ measures the effect of the treatment and is free from spurious influences such as those of the sex of the patient because such factors, being present in both observations, cancel out when subtracted. The ratio method may be viewed as the multiplicative equivalent of the above example, where firm size is the 'spurious' influence to be removed from the ratio components $y$, $x$. In fact, the simplest generalization of the deterministic processes in (2) to allow for randomness would lead to the definition of accounting variables $y$, $x$, as reported in the $j^{\text{th}}$ financial statement, as

$$y_j = y_0 e^{s\tau_j} f_y \quad \text{and} \quad x_j = x_0 e^{s\tau_j} f_x \tag{3}$$

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[13] Not all of the outliers found in ratios are caused by multiplicative skewness. After removing such skewness (for example, by using the logarithmic transformation), the distribution of ratios often turns out to be leptokurtic. Fat tails also create outliers, though on a smaller scale.

[14] A regression where sales explains earnings using data from the U.K. electronics industry can illustrate this. When the Cook Distance (Cook, 1977) is used to identify influential cases for 1988, for example, two firms (GE and STC) are singled out as outliers. After trimming these two firms, three new firms (Sunleigh, English Electric and Brother International) become influential. After also excluding these three firms, one more firm (Synapse Computers) emerges with a new Cook Distance of 80, a value that indicates extreme influence.

$y_0$, $x_0$ are arbitrary constant levels of $y$, $x$ and the common term $e^{\pi_j}$ plays the same role as $\delta_j$ above: it is the component of the variance of $y$, $x$ present in all observations in the $j^{\text{th}}$ financial statement. $f_y$, $f_x$ are random proportions of $y$, $x$ unexplained by the model.[15]

In the above *random effects* models,[16] $y_0$, $x_0$ are specific to variables $y$, $x$ (they are independent of the particular financial statement under analysis), whereas $e^{\pi_j}$ (the extent to which any item in the $j^{\text{th}}$ financial statement is likely to be larger or smaller than the constant level) scales all items in the financial statement irrespective of changes in the particular variables of interest. Similarly to (2), this separation between effects ensures that the ratio $y/x$ removes $e^{\pi_j}$, the effect attributable to the $j^{\text{th}}$ financial statement, thus making company accounts comparable either through time or across firms.

*Stochastic Scale Invariance*

It may be asked whether the conditions of ratio validity leading to (1) are feasible when, as in the above model, variables are random. Scale invariance as defined by equality (1) applies to deterministic changes where the rules of classical differential calculus apply, but not to continuous time processes where stochastic calculus would apply instead of differential calculus.[17] However, it should not be concluded that it is impossible to observe scale invariance in the relationship between stochastic variables. The reason why (1) fails to encompass such variables is that it equates two *effective* rates of change whereas an equality between two *continuous* rates is now required. A formulation of the scale invariance condition that is robust regarding the nature of the variable (i.e., deterministic or stochastic, continuous or discrete) is obtained by equating expected continuous rates of change, as follows:

$$\mathrm{E}\left[\log\frac{y+dy}{y}\right]=\mathrm{E}\left[\log\frac{x+dx}{x}\right]$$

which may be abridged as

$$d\log y = d\log x. \tag{4}$$

Suppose that the two components of a ratio $y$ and $x$ are generated by the stochastic differential equations

$$d\log y_j = s_j dt + \sigma_y dz_y \quad \text{and} \quad d\log x_j = s_j dt + \sigma_x dz_x \tag{5}$$

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[15] In cross-sectional analysis, the median provides an appropriate 'constant' reference level, and likewise the initial value in a time-series context.

[16] Effects model differences in relation to the expectation, where such differences are introduced by components of the variance. Influences such as the two possible sexes are referred to as 'fixed effects' because the component introduced by the difference in sex is deterministic. Where the component is itself a random variable, the effects are called 'random effects'. Size is therefore a random effect. The different financial statements present in a sample represent the levels of an effect. In statistical terms, the accounting numbers in the same financial statement are said to belong to the same level.

[17] A useful introduction to stochastic processes in the context of financial economics is available in Dixit and Pindyck (1994, pp. 59–82) and Campbell *et al.* (1997, pp. 339–49).

where continuously compounding rates of change $d\log y_j$ and $d\log x_j$ stem from a deterministic term $s_j dt$,[18] which is the same for both variables and constant throughout the process thus satisfying the conditions of ratio validity, plus a random term $dz_y$ or $dz_x$ specific to $y$ or $x$ with standard deviation $\sigma_y$ or $\sigma_x$ respectively.[19] The summation of all $dt$, $t$, reflects the length of the accounting period during which the generation of the $j^{\text{th}}$ financial statement takes place, typically one year.

Now, by exponentiation, (5) leads to

$$\frac{dy_j}{y_j} = \left(s_j + \frac{\sigma_y^2}{2}\right)dt + \sigma_y dz_y \quad \text{and} \quad \frac{dx_j}{x_j} = \left(s_j + \frac{\sigma_x^2}{2}\right)dt + \sigma_x dz_x$$

which, after integration, yields the stochastic equivalent to (2) or (3), that is,

$$y_j = y_0 e^{s_j t} e^{\sigma_y z_y} \quad \text{and} \quad x_j = x_0 e^{s_j t} e^{\sigma_x z_x}$$

where $y_0$, $x_0$ are arbitrary constant levels, as above, and $z_y$, $z_x$ are Wiener processes, that is, the time-transformed Brownian motion with independent, normally distributed mean zero increments that is present in Markov chains. Ratios of variables generated as geometric Brownian motions, as above, evolve as

$$\frac{y_j}{x_j} = \frac{y_0}{x_0} e^z \tag{6}$$

thus removing $s_j$, the effect of size from measurement. The term $z$ is also a Wiener process, with variance $(\sigma_y^2 + \sigma_x^2 - 2\rho_{yx}\sigma_y\sigma_x)t$, $\rho$ being the correlation coefficient between $z_y$ and $z_x$.

The ratio components $y_j$ and $x_j$ in (6) obey the robust formulation of scale invariance (4), and the ratio does not necessarily drift upwards or downwards as previously thought.[20] Nevertheless, the time dependence in the variance of $z$

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[18] Similarly to (3), the continuous rate of growth $s_j = s\tau_j$ is the same for all items in the $j^{\text{th}}$ financial statement, modelling the random effect of size upon financial statement $j$ irrespective of the variable considered. Firms that are larger than the industry norm exhibit positive $s_j$ whereas those that are smaller have negative $s_j$.

[19] The random terms $dz_y$, $dz_x$ are limits of increments of Wiener processes as the time interval approaches the infinitesimal $dt$. For practical purposes, $dz_y = z_y\sqrt{dt}$ and $dz_x = z_x\sqrt{dt}$ where $z_y$ and $z_x$ are standard normal random variables that are time independent. Wiener processes are continuous time Markov processes with independent, normally distributed increments with zero mean, the variance of a Wiener process being proportional to time. Thus, $y$ and $x$ obey the Markov condition whereby only the most recent realization contains information useful to predict future realizations. Markov processes are used extensively as plausible approximations to the way variables such as stock prices or earnings are generated (see Ball and Watts, 1972, pp. 665–6). In the literature on financial ratios, Lev (1969) is an early example of the use of Markov processes.

[20] If the process was assumed to equate effective rates on average, they would be described as

$$\frac{dy_j}{y_j} = \mu_y dt + \sigma_y dz_y \quad \text{and} \quad \frac{dx_j}{x_j} = \mu_x dt + \sigma_x dz_x$$

This is the first and most basic process considered by Tippett (1990), and tested indirectly by Tippett and Whittington (1995) for the presence of a drift term in the ratio, where $y_j/x_j$ is held to be an exponential function of $\mu_y - \mu_x + \sigma_y^2 + \sigma_x^2 - \rho_{yx}\sigma_y\sigma_x$. The present article, however, shows that continuous processes such as (5) which obey the robust formulation of scale invariance lead to (6).

generates time dependence in the ratio because, as the magnitude of $z$ increases, negative and positive realizations are differently treated by the exponentiation, spanning the intervals $\{0,1\}$ and $\{1,\infty\}$ respectively. This asymmetry, however, is no longer specific to ratios and a simple logarithmic transformation removes it.

## FINAL COMMENTS

The above discussion may be summarized as follows:

- ratio validity requires not only linearity and an intercept equal to zero in the relationship between the numerator and denominator, but also that proportionate changes in ratio components should be independent of size;
- under such conditions, firm size may be modelled as a common effect specific to each set of financial statements, with each variable being scaled to size and the ratio norm arising from such scaling;
- the statistical properties of certain financial ratios that are thought of as undesirable can be attributed to the aggregation of like transactions under double-entry bookkeeping, but simple transformations can lead to statistically well-behaved ratios;
- mechanisms equating continuously compounding growth rates proportionate to the size of the firm may lead to valid ratios even in the case of random components, and ratios of Markov processes will not necessarily drift.[21]

In setting out these insights into the theoretical foundations of the ratio method, we have addressed the question as to whether the use of financial ratios is motivated more by tradition than by well-founded considerations. It is our conclusion that, in spite of their simplicity, financial ratios are governed by an explicit set of conditions and, moreover, they require data of the type that has been shown to characterize the figures reported in company accounts.

Given these conclusions, one may ask why some previous contributions to the literature on financial ratios have led to such a pessimistic view of ratio analysis. Two reasons may be given. First, it is often assumed that accounting variables are, like many random variables, statistically additive. They are not. The statistical foundations of ratio analysis should be based on the understanding that accounting variables are multiplicative, being governed by proportionate or exponential growth. Second, the way in which firm size influences financial variables has also been misunderstood, leading to much uncertainty as to whether ratios remove size or not.

In this context, we return to the often quoted statement attributed to Lev and Sunder (1979): that almost all of the assumptions required for valid ratio analysis are likely to be violated in practice. The statement is formally correct, of course, but it might as well be applied to Newton's laws of motion and to many other models considered as good enough approximations in normal circumstances. Nevertheless, the statement by Lev and Sunder is misleading. Distortion, in spite of its presence in mathematical models, may be small in specific cases such as in the case of nonproportionality. Moreover, when weighing inaccuracy against the ability to provide an intuitive interpretation with a parsimonious model, the trade-off could prove to be largely favourable to the less accurate methodology.

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[21] The article also leaves a number of details unexplored. First, other diffusion processes should be tested against the ratio model. Second, the extent to which scale invariance holds for different ratios and the relative importance of size compared to other statistical effects are each in need of clarification. Finally, the extent to which deviations from strict lognormality and a variance which increases with time make the measurement dependent on norms or size is an open question.

The kind of trade-off referred to above is particularly relevant to the ratio method. Ratios, having just one degree of freedom, are able to measure deviations from the norm. The condition of constant proportionate growth (or scale invariance) is a direct consequence of this: one unique parameter is able to deal with scale invariant changes, that is, the modelling of the common growth of both components. By providing deviations from the norm, ratios are able to provide in a succinct form the information that financial analysts seek. Conversely, analysts would find it more difficult to use models where the relevant information is contained in several parameter values, and the more complex such models are, the more sensitive they become to irregular data or to influences not necessary in the financial decision process.

Thus, to conclude, the challenge facing research into financial ratio analysis is not how to increase the complexity of models. Rather, it is how to take account of the limitations of the parsimonious ratio model without changing the specific characteristics of the measurement.

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# Culture, Corporate Governance and Disclosure in Malaysian Corporations

Evidence from research conducted on corporate accounting indicates that the interaction of environmental factors influences disclosure practices. The purpose of this study is to examine the importance of various corporate governance and cultural (race and education) characteristics, in addition to firm-specific factors, as possible determinants of voluntary (non-mandatory accounting and non-accounting information) disclosures in the annual reports of Malaysian listed corporations. The results of the regression analysis indicate significant associations (at the 5 per cent level) between two corporate governance variables (*viz.* chair who is a non-executive director and domination of family members on boards) and the extent of voluntary disclosure. This finding has implications for corporate governance policy formulation by the Malaysian Institute of Corporate Governance (MISG). One cultural factor (proportion of Malay directors on the board) is significantly associated (at the 5 per cent level) with the extent of voluntary disclosure suggesting that governmental focus on culture may solicit a response to secrecy from those who feel threatened.

**Key words:** Accounting; Culture; Disclosure; Malaysia; Voluntary.

The purpose of this article is to examine the relationship between a number of corporate governance, cultural and firm-specific characteristics and the extent (range and scope) of voluntary disclosure in the annual reports of Malaysian companies. The aim is to enhance our understanding of influences that help explain voluntary disclosure in a developing country in which government takes an interest in culture and corporate governance issues, while controlling for firm-specific factors.

Disclosure practice does not develop in a vacuum, but rather reflects the underlying environmental influences that affect managers and companies in different countries (Choi and Levich, 1990; Adhikari and Tondkar, 1992). A variety of environmental factors affecting disclosure practices adopted by companies have been identified (Wallace and Gernon, 1991; Radebaugh and Gray, 1993). These factors include the economy, capital markets, accounting and regulatory framework, enforcement mechanisms, and culture and form part of what is referred to as 'environmental determinism theory' (Cooke and Wallace, 1990).

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Studies in the area have considered various firm-specific characteristics that may affect disclosure in corporate reports. However, prior research fails to explore corporate governance and cultural factors, despite recognition of their importance in recent years. Since disclosure is an 'accounting activity involving both human and nonhuman resources or techniques as well as the interaction between the two' (Perera, 1994, p. 268), studies in this area would benefit if both corporate governance and cultural factors are considered. Corporate governance should be considered because it is the board of directors that manages information disclosure in annual reports (Gibbins *et al.*, 1990) and therefore disclosure may be a function of the constituents of boards. Cultural factors are important because the traditions of a nation are instilled in its people and might help explain why things are as they are.

The factors being considered here involve the human aspect along with individuals' interactions in shaping reality, while other environmental factors, especially firm-specific characteristics, reflect non-human aspects of disclosure practice. As Gibbins *et al.* (1990, p. 143) have argued, 'organizations may disclose information to support the efficiency of exchange and production, but they also disclose information to establish their compliance with the social values reflected in regulations and informal norms. The rules affecting disclosure are unlikely to reflect one imperative to the exclusion of the others.' Hence, the theoretical framework is multi-perspective recognizing inherent difficulties of constructing any ground theory to explain social phenomena (Gibbins *et al.*, 1990).

Malaysia is of interest not only because it is a developing country with an emerging capital market but because there is considerable division based on ethnicity, religion and language. Indeed, in 1969 there were riots involving Malays (approximately 56 per cent of the population) against the Chinese ethnic group which led to affirmative action the following year in what was called the New Economic Policy. The political elite in Malaysia has a reputation for racializing issues although there is a debate as to whether discrimination is primordial (Milne, 1981) or class-based (Brennan, 1982). However, the New Economic Policy institutionalized positive discrimination in favour of bumiputra[1] by offering concessions in terms of grants, trade, education and certain jobs. Thus, an examination of disclosure in a multiracial society like Malaysia will contribute to knowledge.

## DEVELOPMENT OF HYPOTHESES

### *Corporate Governance*

Although there is a growing literature on corporate governance issues, discussions on the function of directors in the disclosure process have not been extensively explored. Most studies have considered the relation between corporate performance and various corporate governance characteristics. For instance, Grace *et al.*

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[1] Bumiputra refers not only to Malaysians of Malay but other indigenous ethnic groups (Malaysia, 1991). However, for the purposes of this study, bumiputra refers to the Malay group since they form the majority, are all Muslims, and such a classification may help the analysis.

(1995) try to relate corporate performance to board composition and non-executive directors' characteristics while Shamsher and Annuar (1993) examine incongruencies of management and owners' interests by also looking at board composition and role duality. Besides these two factors, cross-directorships is another variable often discussed in the corporate governance literature. The following sections discuss the development of the hypotheses relating to the corporate governance variables examined in this study.

*Board Composition—Domination by Non-Executive Directors* Board composition is defined as 'the proportion of outside directors to the total number of directors' (Shamser and Annuar, 1993, p. 44), thereby making a distinction between executive and non-executive (outside) directors. There are two views on this issue—those who argue for more non-executive directors on boards and those who favour more executive directors.

Those who are in favour of more non-executive directors on the board base their arguments on two theories: agency and resource dependency. The premise of agency theory is that non-executive directors are needed on the boards to monitor and control the actions of executive directors due to their opportunistic behaviour (Jensen and Meckling, 1976). Mangel and Singh (1993) believe that non-executive directors have more opportunity for control and face a complex web of incentives, stemming directly from their responsibilities as directors and augmented by their equity position. Thus, non-executive directors are seen as the check and balance mechanism in enhancing boards' effectiveness. Others who also see the role of non-executive directors as monitors of management's performance and actions include Fama and Jensen (1983), Pettigrew and McNulty (1995) and Mak (1996). Additionally, outside directors might be considered to be 'decision experts' (Fama and Jensen, 1983), independent and not intimidated by the chief executive officer (CEO) (Weisbach, 1988), able to reduce managerial consumption of perquisites (Brickley and James, 1987), and act as a positive influence over directors' deliberations and decisions (Pearce and Zahra, 1992).

In addition to the control aspect, the presence of non-executive directors on boards provides 'additional windows on the world' (Tricker, 1984, p. 171). This suggestion is best implied by the resource dependence theory, which proposes that non-executive directors provide firms with links to the external environment due to their expertise, prestige and contacts. Mace (1971) and Spencer (1983) suggest that non-executive directors often see themselves in an advisory rather than a decision-making role but since they are respected for their wisdom and independence, they will be influential and listened to, although it may not be their function to actually institute policy. Others who are also in favour of non-executive directors' domination on boards based on the resource dependence theory include Kesner and Johnson (1990) and Grace *et al.* (1995).

In contrast, a high proportion of non-executive directors on boards, as proposed by agency and resource dependence theories, also has drawbacks. Arguments against boards dominated by non-executive directors include stifling strategic actions (Goodstein *et al.*, 1994), excessive monitoring (Baysinger and Butler, 1985), lack of business knowledge to be effective (Patton and Baker, 1987), and lack of real independence (Demb and Neubauer, 1992).

In terms of corporate disclosure, board composition might be an interesting variable to consider because it will indirectly reflect the role of non-executive directors, that is, more disclosure may be expected if they do actually carry out their monitoring role rather than their 'perceived' monitoring role. Similarly, their dominance (in terms of number) could provide them with more power to force management to disclose.

In the case of Malaysia, there is evidence of dominance (in terms of proportion of non-executive directors to total number of directors) of non-executive directors on boards as companies are required to set up audit committees consisting of a majority of non-executive directors. Based on discussions regarding the potential effectiveness of the governing role of non-executive directors and the existence of audit committees in Malaysian companies we hypothesize that:

H1: *Ceteris paribus*, there is a positive association between proportion of non-executive directors on the board and the extent of voluntary disclosure of information.

*Board Composition—Domination by Family Members* Besides composition in terms of non-executive directors on boards, the proportion of family member representation might also have an influence on disclosure practice. In countries where families have substantial equity holdings, there is generally little physical separation between those who own and those who manage capital (Nicholls and Ahmed, 1995). As such, capital owners do not have to rely extensively on public disclosure to monitor their investments since they have greater access to internal information (Adhikari and Tondkar, 1992). Thus, demand for public disclosure and reporting will generally be lower.

In the case of Malaysia, there are a number of listed companies with substantial family shareholdings that elect family members to sit on the boards both as executive and non-executive directors. As such, they may be expected to disclose less information due to better access to internal information. Therefore:

H2: *Ceteris paribus*, there is a negative association between proportion of family members on the board and the extent of voluntary disclosure of information.

*Role Duality* An aspect of corporate governance that has given rise to concern is the 'dominant personality' phenomenon and this has been found to be associated with poor disclosure (Forker, 1992). This phenomenon includes role duality, when the CEO is also chair of the board. There are two views regarding this issue. Proponents of agency theory argue for separation of the two roles to provide essential checks and balances over management's performance. Furthermore, when the CEO is also the chair, the board's effectiveness in performing its governing function may be compromised because the CEO will be able to control board meetings, select agenda items, as well as select board members. Separation of the two roles has been advocated by Argenti (1976) and Blackburn (1994).

The alternative argument is that separation of roles is not crucial since many companies are well run with combined roles and have strong boards fully capable of providing adequate checks. Furthermore, when the role is combined, the CEO may be able to shape the company to achieve stated objectives as there will be less interference. Role duality is advocated by Eisenhardt (1989), Dahya *et al.* (1996), Donaldson and Davis (1991) and Rechner and Dalton (1991). Their arguments are based on stewardship theory in which managers act in the best interests of the firm and shareholders, and role duality enhances the effectiveness of boards.

In summary, those who favour role duality argue on the basis of stewardship theory in contrast to agency theory which views executive managers as opportunistic shirkers. Stewardship theory adopts a more positive perspective, viewing directors as guardians of corporate assets and wishing to do their best for the company. As such, there is no problem if the two roles are combined.

Nevertheless, separation of the roles of chair and chief executive will help enhance monitoring quality and reduce the advantages gained by withholding information, thereby improving the quality of reporting (Forker, 1992). In the Malaysian context, role duality is not particularly common among listed companies but the potential impact on disclosure is considered worthy of testing. Therefore, we hypothesize that:

H3: *Ceteris paribus*, there is a negative association between role duality and the extent of voluntary disclosure of information.

*Position of Chairperson* The position of the chairperson is also thought to be important in improving board effectiveness. Studies by Rechner and Dalton (1991), Donaldson and Davis (1991) and Berg and Smith (1978) found that independent non-executive chairpersons improve company performance. However, Chaganti *et al.* (1985) found that executive chairpersons have no effect on performance. An independent chairperson may encourage additional disclosure for similar reasons to those outlined for role duality. The majority of chairpersons in Malaysian companies are non-executive directors and therefore more disclosure may be expected due to their independence. Therefore:

H4: *Ceteris paribus*, there is a positive association between a non-executive chairperson and the extent of voluntary disclosure of information.

*Cross-Directorships by Board Members* Another aspect of corporate governance is that directors (regardless of executive or non-executive) may sit on more than one board (cross-directorships). Dahya *et al.* (1996) suggest that cross-directorships will help in making information more transparent as comparisons can be made based on knowledge of other organizations. However, others argue that this will put the company at a competitive disadvantage and in the case of executive directors, their existence on more than one board will make them less independent as they will be more sympathetic towards others in similar positions (Davis, 1993). Arguments for and against cross-holdings are based on resource dependence theory

(Davis, 1996), bank control theory (Kotz, 1978) and financial hegemony theory (Mintz and Schwartz, 1985).[2]

The implication of these theoretical approaches is that the interlocking network should consist of executives of powerful firms sitting on boards of dependent buyers, suppliers and banks (Davis, 1996). Such a structure, known as compound boards, can be found in Japan where reciprocal shareholdings and interlocking relationships are common in keiretsu or corporate groups (Cooke, 1992, 1996). In contrast, a unitary board which is common in many countries (especially in Anglo-Saxon countries) may not represent distributed intelligence or variety in information control as that of compound boards. Furthermore, such boards do not have inside information to evaluate management and also they are not likely to have specialized firm or industry-specific information to add value (Turnbull, 1997).

Several studies in recent years have documented that difference in control structures and interlocking relationships have important implications for the governance function as they are related to independence of directors. Those against interlocking relationships argue that they are devices for intercorporate collusion (Pfeffer and Salancik, 1978), for bank control over corporate decision making (Kotz, 1978), and for the aggregation and advancement of collective interests of the corporate elite (Useem, 1984).

An argument in favour of interlocking directors is that members of other boards can offer insights or comparisons derived from personal knowledge of other organizations (Dahya *et al.*, 1996). Thus, decisions at one board become part of the raw material for decisions at other boards. Lorsch and MacIver (1989) assert that the interlocking of CEOs is desirable because of their experience and credibility as peers. Furthermore, 'serving on a board is a way to see how somebody else is doing the same thing you're doing' (Lorsch and MacIver, 1989, p. 27). Thus, CEOs join other boards and thereby create interlocking relationships specifically to 'embed' what they are doing (Davis, 1996).

In summary, cross-directorships held by members of boards have important implications for disclosure practice as there will be greater access to information in more than one company. Consequently, companies may become more 'transparent' and preference for confidentiality diminished. In the case of Malaysia, cross-directorships are common among listed companies but their influence on disclosure practice is unknown. Since cross-directorships could help to increase transparency, we hypothesize that:

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[2] Resource dependence theory suggests that a representation of critical buyers and suppliers on the board will make them more empathic with the concerns of the focal organization, while the representation of competitors will make it easier to collude (Pfeffer and Salancik, 1978). Therefore, the focal firm can use interlocks to manage its resource interdependencies. Based on bank control theory, Kotz (1978) suggests that interlocking relationships are a means by which banks can exercise influence over firms while the financial hegemony theory sees bank interlocks as a more diffuse source of information flows overlaid on capital flows (Mintz and Schwartz, 1985). This implies that commercial banks form a 'stable core' of the interlock network due to their centrality in directing investments (Mintz and Schwartz, 1985, p. 182).

H5: *Ceteris paribus*, there is a positive association between the proportion of board of directors with cross-directorships and the extent of voluntary disclosure of information.

*Chairperson With Cross-Directorships* When a chairperson has cross-directorships, insights can be offered on disclosure of information based on experiences derived from personal knowledge of other companies. Furthermore, being the chairperson of the board enables influence to be exerted on certain issues, including disclosure of information in annual reports. Thus:

H6: *Ceteris paribus*, there is a positive association between a chairperson with cross-directorships and the extent of voluntary disclosure of information.

## CULTURAL CHARACTERISTICS

Culture is an extremely elusive construct (Jahoda, 1984) and Kroeber and Kluckholn (1952), half a century ago, identified 164 definitions. One definition of culture is 'the learned, socially acquired traditions and life styles of the members of a society, including their patterned, repetitious way of thinking, feeling and acting' (Harris, 1987, p. 6).[3] Since accounting is a socio-technical activity involving the interaction of both human and non-human resources, accounting practice cannot be culture-free (Violet, 1983), especially in the case of disclosure. However, determining a disclosure model that encompasses a cultural framework is not easy as cultural factors are difficult to operationalize (Adhikari and Tondkar, 1992).

In the case of Malaysia, the mind of Malaysian managers is said to be influenced by race, education and type of organization they work for (Chuah, 1995).[4] Thus, operationally, race and education act as suitable surrogates for culture in this study but the researchers acknowledge that the measure is partial. Race is chosen because it is a significant marker of class relations and provides a principle 'according to which conflicts over wealth and state power take place' (van Fossen, 1998, p. 89). In addition, the effect of race may be of significance in multicultural societies where each ethnic group prefers to maintain its ethnic identity (Sendut, 1991). In effect, managers in general perform the same functions but the way they do it could be different because it may be affected by 'one's own tradition, history, values, beliefs and culture' (Alhabshi, 1994, p. 24). Education is chosen because it is thought of 'as a vehicle of the state . . . In Asian countries the emphasis of education is on "nation building", however this may be conceived'

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[3] Some other definitions include 'the totality of equivalent and complementary learned meanings maintained by a human population, or by identifiable segments of a population, and transmitted from one generation to the next' (Rohner, 1984, p. 119); 'the shared ways groups of people understand and interpret the world and also the way in which a group of people solves problems' (Trompenaars, 1993, p. 316), and 'the collective programming of the mind which distinguishes the members of one human group from another' (Hofstede, 1980, p. 25).

[4] Although some references cited on Malaysian cultural factors in this section lack empirical support, Malaysians accept them as common knowledge. Furthermore, empirical work could be biased because most Malaysians are uncomfortable and sensitive when such issues are raised or discussed.

(Mackerras *et al.*, 1998, pp. 3–4). The following sections discuss the development of hypotheses that relate to the cultural variables.

*Race* In multiracial countries, the prevailing societal values may not reflect the values of the nation as a whole, especially if each racial group has chosen to maintain its own ethnic identity and values. Difference between the groups is greater if there exists a history of conflict or in which racial differences coincide with national or socioeconomic differences (Pettigrew, 1979). Similarly, the extent of shared values and degree of cooperation is determined by organizational coordinating activities and formality in the system (Birnberg and Snodgrass, 1988). Therefore, it is important to acknowledge that values may differ between groups even within a nation (Specter and Solomon, 1990).

In the context of Malaysia, accounting disclosure practice may reflect not only differences in societal values based on race and religion of the two main ethnic groups involved in business, but also as a result of government economic policy. In order to test for the possible association between societal values and voluntary disclosure practice, the four bipolar cultural dimensions advanced by Hofstede (1991) for the two main ethnic groups involved in business activities (namely, the Chinese and Malay) and the four accounting values put forward by Gray (1988) are adopted in this study.

The authors accept that the Hofstede–Gray theory is difficult to test and in relation to financial reporting their measures lack precision, are somewhat indirect and based on a dated survey of IBM employees. Nevertheless, some researchers have used the four bipolar dimensions in comparative studies of accounting practice in Lebanon and France (Baydoun and Willett, 1995) and voluntary social accounting disclosure in the Asia–Pacific region (Williams, 1999). Additionally, a direct test of the Gray (1988) theory linking accounting values and systems with Hofstede's (1980) cultural constructs was undertaken by Salter and Niswander (1995). Using data from twenty-nine countries, Salter and Niswander (1995, p. 379) find that 'while Gray's (1988) model has statistically significant explanatory power, it is best at explaining actual financial reporting practices and is relatively weak in explaining extant professional and regulatory structures from a cultural base'.

Hofstede (1991)[5] suggests that the two main ethnic groups in Malaysia are both low on masculinity but high on power distance. The former is evidenced by their values of being considerate, caring, shameful and preserving 'face' while the latter through their values of respect for others, acceptance of social rank, loyalty to the ruler and filial piety to one's parents (Abdullah, 1992). However, the Malays are

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[5] We did not use Hofstede's (1991) ranking of the cultural dimensions for Malaysia as we are interested in ethnic values within a nation. Although ranking of cultural dimensions of Hong Kong and Indonesia (since all Malays are Muslims) could be used as proxies for Chinese and Malay ethnic groups respectively, we feel that it would not be an accurate reflection of societal values of the two groups because their values have been shaped by other factors that make them distinctive. As such, we rely on articles written by Hofstede (1991) and Abdullah (1992) in associating ethnic values with the cultural dimensions.

TABLE 1

THE INTERRELATIONSHIP BETWEEN SOCIETAL VALUES, TRANSPARENCY AND DISCLOSURE

| Hofstede societal values | Ethnic groups | Gray<br>Accounting value transparency | Gray<br>Accounting practice disclosure |
|---|---|---|---|
| | *Malay* | | |
| Power distance | High | | |
| Masculinity | Low | High secrecy | Low disclosure |
| Uncertainty avoidance | High | | |
| Individualism | Low | | |
| | *Chinese* | | |
| Power distance | High | | |
| Masculinity | Low | Low secrecy | High disclosure |
| Uncertainty avoidance | Low | | |
| Individualism | High | | |

said to have high uncertainty avoidance which may be attributed to their strong belief in religion, which is reflected in their values of non-assertiveness, conflict avoidance and uneasiness in dealing with ambiguities and uncertainties (Abdullah, 1992). On the other hand, the Chinese are rated low on uncertainty avoidance, as evidenced by their greater acceptance of new challenges and willingness to take greater risk (Abdullah, 1992). In terms of individualism, the Malays are rated lower, which is partly attributed to their religion (Islam) which encourages collectivism because 'under Islam, social order is closer to collectivism and rights of private ownership are ultimately subordinate to Allah' (Baydoun and Willett, 1995, p. 89). This is reflected in their values of getting along well with others (Abdullah, 1992). In contrast, the Chinese are considered more individualistic at the national level which may partly be attributed to the presence of communal ideology and ethnic polarization in the socioeconomic structures (Tan, 1984).

Table 1 presents the interrelationship between Hofstede's societal values and Gray's accounting values and practice, that is, transparency and disclosure respectively. It can be seen that only two societal values, uncertainty avoidance and individualism, differ between the two ethnic groups.

Based on a Hofstede–Gray theoretical framework, the Malays may be expected to be relatively more secretive compared to their Chinese counterparts, and high secrecy implies lower disclosure. This notion is used in determining whether the race of the managing director, finance director and chairperson influences disclosure practice in Malaysia. Similarly, the domination of boards and the proportion of shares held by one race could also affect corporate disclosure policy. Hence, we hypothesize that:

H7: *Ceteris paribus*, there is a negative association between a Malay managing director and the extent of voluntary disclosure of information.

H8: *Ceteris paribus*, there is a negative association between a Malay finance director and the extent of voluntary disclosure of information.

H9: *Ceteris paribus*, there is a negative association between a Malay chairperson and the extent of voluntary disclosure of information.

H10: *Ceteris paribus*, there is a negative association between the proportion of Malay directors on the board and the extent of voluntary disclosure of information.

H11: *Ceteris paribus*, there is a negative association between the proportion of Malay shareholdings and the extent of voluntary disclosure of information.

*Education—Board of Directors* Educational background can be an important determinant of disclosure practice with better educated managers being more likely to adopt innovative activities and accept ambiguity (Hambrick and Mason, 1984). In contrast, Ralston *et al.* (1993) suggest that industrialization from developed to less developed countries will lead to a 'homogenizing effect' as there will be an increase in common education to support technology that will further increase homogeneity across societies. Furthermore, with Western influence in education, managers may have modified some of the century-old values peculiar to society and this could play a vital role in explaining their disclosure behaviour (Merchant *et al.*, 1995).

Nevertheless, Gray (1988) identified education as an institutional consequence affecting accounting values and practices and Grace *et al.* (1995) observe that the level of education should be examined as a crude measure for professional status. Wallace and Cooke (1990, p. 84) posit that 'an increase in the level of education in a country may increase political awareness and demand for corporate accountability'. Therefore, if a board of directors consists of individuals having an academic background in accounting and business, they may choose to disclose more information to demonstrate accountability, improve the company's corporate image, and also to offer credibility of the management team. Therefore:

H12: *Ceteris paribus*, there is a positive association between the proportion of directors on the board trained in business and/or accounting and the extent of voluntary disclosure of information.

*Education of the Financial Controller* The academic background of the financial controller is just as important as other directors since the responsibility for preparing annual reports rests mainly with the principal accounting officer of the company (Abayo and Roberts, 1993; Ahmed and Nicholls, 1994). However, Parry and Groves (1990) in their assessment of whether the employment of qualified accountants had any impact on the quality of financial reporting found no significant relationship. Abayo and Roberts (1993) argue that an accounting qualification alone is not the solution to problems faced by developing countries with respect to inadequate accounting systems. Corporations in general are unlikely to provide high-quality information if the demand function does not exist or if laws and regulations governing information provision are not enforced.

There is also a perception that professionally qualified accountants from overseas receive more rigorous professional training and exposure compared to locally trained accountants and might be expected to disclose more information (Ahmed and Nicholls, 1994). Similarly, professional training in accounting or finance will help financial controllers to be more aware of disclosure issues. An analysis of the qualifications of financial controllers in Malaysian listed companies in this study indicates that not all controllers have accounting or finance qualifications. This is particularly the case in companies with substantial family shareholdings. Other popular qualifications held by financial controllers include engineering and law. Financial controllers, trained in accounting and/or finance, are likely to prefer greater disclosure to demonstrate accountability and enhance the image of the company. Hence:

H13: *Ceteris paribus*, there is a positive association between a finance director trained in accounting or finance and the extent of voluntary disclosure of information.

*Firm-Specific Characteristics*

There has been extensive empirical work relating firm-specific characteristics to the extent of voluntary disclosure based on a number of theoretical arguments which include agency theory, signalling theory, capital market theory and cost-benefit theory. These characteristics can be classified into three non-mutually exclusive categories[6]: structure (size, leverage, diversification, complexity, assets-in-place, ownership structure); performance (profitability); and market-related (industry type, listing status, auditor type, listing age, foreign activities). The following sections discuss the development of hypothezes relating to the firm-specific variables.

*Structure-Related Variables: (a) Size* Size may be important because of: the need to raise capital at the lowest cost (Choi, 1973); pressure from shareholders themselves and investment analysts for greater disclosure (Schipper, 1981); closer monitoring by regulatory authorities (Firth, 1979); the complexity of the business structure (Buzby, 1975); and greater demands to provide information to various user groups for entities of economic significance. We use total assets as a measure of size which has been adopted in several studies (Cerf, 1961; Singhvi, 1967; Cooke, 1989a, 1989b, 1991, 1992; Wallace *et al.*, 1994). Size has been found to be a significant variable in previous research studies (see, e.g., Cerf, 1961; Buzby, 1975; Courtis, 1978; Soh, 1996; Cooke, 1989a, 1989b, 1991, 1992) and we hypothesize that:

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[6] Performance-related variables are those that may vary over time and present information that may be of interest to accounts users while structure-related variables describe a firm on the basis of its underlying structure. Market-related variables are those that may be time-period specific and/or relatively stable over time, may be within or outside the control of the firm and may belong to a particular category of classification (Wallace *et al.*, 1994).

H14: *Ceteris paribus*, there is a positive association between the size of a company and the extent of voluntary disclosure of information.

*(b) Gearing/Borrowings* Gearing has been found to be an important explanatory variable by Belkaoui and Kahl (1978), Malone *et al.* (1993) and Wallace *et al.* (1994). Highly geared companies disclose more information to assure creditors that shareholders and management are less likely to bypass their covenant claims (Myers, 1977; Schipper, 1981) as well as to meet some of the needs of lenders (Cooke, 1996). Hence:

H15: *Ceteris paribus*, there is a positive association between highly geared companies and the extent of voluntary disclosure of information.

*(c) Diversification* Diversification refers to an act of extending the number of product lines or entering into a variety of industries. Greater disclosure may be expected when companies are highly diversified especially if they compete in different markets and technologies where risk may be high (McKinnon and Dalimunthe, 1993). As such:

H16: *Ceteris paribus*, there is a positive association between highly diversified companies and the extent of voluntary disclosure of information.

*(d) Complexity* Structural complexity has been suggested as significant in explaining variability in the extent of voluntary disclosure. Courtis (1978) and Cooke (1989a) suggest that structural complexity requires a firm to have an effective management information system for monitoring purposes and the availability of such a system helps to reduce the cost of information production per unit and thus, higher disclosure. The next hypothesis is:

H17: *Ceteris paribus*, there is a positive association between structural complexity of business and the extent of voluntary disclosure of information.

*(e) Assets-in-Place* This refers to the amount of fixed assets owned by companies in relation to other assets. An increase in the firm's fixed assets results in lower agency costs and consequently lower disclosure (Myers, 1977). We hypothesize that:

H18: *Ceteris paribus*, there is a negative association between proportion of assets-in-place and the extent of voluntary disclosure of information.

*(f) Ownership Structure* Diffusion and type of equity owners have been suggested as important variables in explaining variability of disclosure. Disclosure will be greater for companies with diffuse ownership because it helps owners to monitor behaviour of management as predicted by agency theory (Leftwich *et al.*, 1981; Craswell and Taylor, 1992; McKinnon and Dalimunthe, 1993; Hossain *et al.*, 1994; Raffournier, 1995). This study uses percentage of shares owned by the top ten shareholders as a proxy for diffusion as used by Hossain *et al.* (1994). Thus:

H19: *Ceteris paribus*, there is a positive association between diffusion of ownership and the extent of voluntary disclosure of information.

The demand for disclosure is also greater when a high proportion of shares are held by foreigners, due to the separation between management and owners geographically (Schipper, 1981; Bradbury, 1991; Craswell and Taylor, 1992). Higher disclosure may be expected because substantial funding in the Malaysian capital market comes from foreign investors. Thus:

H20: *Ceteris paribus*, there is a positive association between a high proportion of shares held by foreign investors and the extent of voluntary disclosure of information.

Besides shareholdings by foreign investors, substantial shareholdings by institutional investors may also encourage higher disclosure to reduce informational asymmetry (Diamond and Verrecchia, 1991). Therefore:

H21: *Ceteris paribus*, there is a positive association between a high proportion of shares held by institutional investors and the extent of voluntary disclosure of information.

*Performance–Related Variable: Profitability* Previous research has tended to find a positive association between profitability and voluntary disclosure. Managers are motivated to disclose more detailed information to support the continuance of their positions and remuneration (Singhvi and Desai, 1971; Courtis, 1978) and to signal institutional confidence (Ross, 1979). This leads to:

H22: *Ceteris paribus*, there is a positive association between profitability and the extent of voluntary disclosure of information.

*Market-Related Variables: (a) Industry Type* Levels of disclosure may vary according to industry type. Higher disclosure may be expected of companies in politically sensitive industries such as oil and gas (Whittred and Zimmer, 1990), manufacturing (Cooke, 1992) and those that are highly regulated (Ng and Koh, 1994). Hence:

H23: *Ceteris paribus*, there is association between industry type and the extent of voluntary disclosure of information.

*(b) Multiple Listing* Companies that are listed beyond their domestic capital market disclose more information because they comply with foreign regulations (Choi and Mueller, 1984; Cooke, 1989; Gray *et al.*, 1995) and meet the needs of capital markets to obtain funds on favourable terms (Gray *et al.*, 1995). Therefore:

H24: *Ceteris paribus*, there is a positive association between multiple listings and the extent of voluntary disclosure of information.

*(c) Type of Auditor* The size of audit firm has been related to the extent of disclosure. The Big Six audit firms (proxy for big audit firms) are said to be more likely to influence companies to disclose additional information because they have greater expertise and experience (Wallace *et al.*, 1994), want to maintain their reputations (DeAngelo, 1981; Chow, 1982; Ahmed and Nicholls, 1994) and act as

a mechanism for limiting opportunistic behaviour by agents (Jensen and Meckling, 1976; Watts, 1977; Watts and Zimmerman, 1986). Therefore:

H25: *Ceteris paribus*, there is a positive association between large audit firms and the extent of voluntary disclosure of information.

*(d) Listing Age* The length of time a company has been listed on a capital market may be relevant in explaining variability in the disclosure of information. A recently listed company may want to raise additional capital at the lowest cost compared to mature companies which may rely more on internal funds (Choi, 1973; Spero, 1979). In addition, newly listed companies need to disclose more information to reduce scepticism and boost confidence of investors who may perceive them as more risky. As such:

H26: *Ceteris paribus*, there is a negative association between listing age of companies and the extent of voluntary disclosure of information.

*(e) Foreign Activities* Companies that are involved in foreign activities are likely to have greater experience in handling and disseminating information. Consequently, we hypothesize that:

H27: *Ceteris paribus*, there is a positive association between companies involved in foreign activities and the extent of voluntary disclosure of information.

## RESEARCH DESIGN

This section on research design helps explain where we obtained the data, how we operationalized the dependent and independent variables, and the form of analysis being undertaken to test the hypotheses.

### *The Annual Report Sample*

This survey covers 167 companies that published their annual reports during the year ended 31 December 1995. The companies were selected using a stratified random sample from the *Annual Companies Handbook* (1995), published by the Kuala Lumpur Stock Exchange (KLSE). All banks, insurance and unit trusts companies were excluded because of different statutory requirements. The selected companies were contacted by letter and requests were made for the English version of their 1995 annual reports. The overall response rate was 83 per cent and a test for non-response bias indicated that the sample is soundly based.

### *Dependent Variable*

*Development of Disclosure Checklist* The dependent variable, voluntary disclosure, is measured by an index of disclosure. Before determining the index for each company in the sample, a scoring sheet was prepared based on the selection of voluntary items of information, that is, over and above what is required by company statute and stock exchange listing rules. Items were selected based on previous research, particularly work by Hossain *et al.* (1994) and Soh (1996), and applicability to the Malaysian environment.[7] The preliminary list was further screened to eliminate any mandatory items found in the Companies Act 1965, accounting standards promulgated by the Malaysian Institute of Accountants as well as KLSE Listing Requirements and refined by three practising Malaysian accountants to ensure validity of the research instrument. The scoring sheet was then piloted on twenty companies to ensure that items peculiar to each selected sector were taken into account. The final checklist instrument consisted of sixty-five voluntary disclosure items (see Appendix).

*Scoring the Disclosure Items and Disclosure Index* The approach to scoring items is essentially dichotomous in that an item scores one if disclosed and zero if it is not, although no penalty is imposed if the item is considered irrelevant. To ensure that judgment of relevance is not biased, the entire annual report is read before any decision is made (Cooke, 1992, 1996), and to ensure consistency the research instrument was completed by one researcher. Procedures used to increase reliability of the research instrument consist of checking completion of the instrument in assessing corporate annual reports, ensuring that all items of disclosure across companies are treated equally, and pilot testing. The scores for each item were then added and equally weighted to derive a final score for each company. The disclosure index $I_j$ for each company is calculated as follows:

$$I_j = \frac{\sum_{i=1}^{n_j} X_{ij}}{n_j}$$

where $n_j$ = number if items expected for $j^{\text{th}}$ firm, $n_j \leq 65$,
$X_{ij} = 1$ if $i^{\text{th}}$ item disclosed,
0 if $i^{\text{th}}$ item not disclosed,
so that $0 \leq I_j \leq 1$.

*Independent Variables*

*Selection of Variables* The independent variables are categorized into three groups: corporate governance, cultural and firm-specific. Since none of the previous published research on disclosure has considered corporate governance and cultural factors, the researchers decided to conduct personal interviews with six finance directors and four consultants who are involved in the preparation of annual reports with the aim of determining the suitability and relevance of these variables in analysing Malaysian disclosure practice.[8] Based on their responses, all the corporate governance and cultural factors were considered relevant for analysis.

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[7] Craig and Diga (1996) also studied disclosure practice in Malaysia but their study did not focus on voluntary disclosure and therefore did not influence the research instrument developed here.

[8] As race is a sensitive issue and to avoid respondent bias, the interviewees came from both ethnic groups.

*Sources of Information* Information on variables used in this study is based on a variety of sources. This includes the companies' annual reports, the KLSE *Annual Companies Handbook* 1995/1996, the Registrar of Companies (ROC), *New Malaysian Who's Who* and published articles on directors. In addition, company secretaries were contacted by letter for information that is not publicly available. Table 2 provides a summary of the operationalization of the independent variables selected as well as their source of information.

TABLE 2

SUMMARY OF THE OPERATIONALIZATION OF INDEPENDENT VARIABLES

| Independent variables | Operationalization | Source of information |
|---|---|---|
| Corporate characteristics | | |
| Size | Total assets as at 31 December 1994 | Company annual report |
| Assets-in-place | Book value of net fixed assets to book value of total assets | Company annual report |
| Industry type | Consumer, industrial, construction/property, trading/ services, plantation/mining | KLSE *Annual Companies Handbook* 1995/96 |
| Listing age | Actual length of listing | KLSE *Annual Companies Handbook* 1995/96 |
| Complexity of business | Actual number of subsidiaries | KLSE *Annual Companies Handbook* 1995/96 and company annual report |
| Level of diversification | Herfindahl index-line of business | KLSE *Annual Companies Handbook* 1995/96 and company annual report |
| Multiple listing status | Domestic only vs domestic and foreign listing | KLSE *Annual Companies Handbook* 1995/96 and company annual report |
| Foreign activities | Dichotomous; yes/no | KLSE *Annual Companies Handbook* 1995/96 and company annual report |
| Gearing | Debt ratio defined as total debt to total assets | Company annual report |
| Ownership structure: | | |
| Top ten shareholders | Ratio of total shares owned by top ten shareholders to total number of shares issued | KLSE *Annual Companies Handbook* 1995/96 |
| Foreign ownership | Ratio of total shares owned by foreigners to total number of shares issued | KLSE *Annual Companies Handbook* 1995/96 |
| Institutional investors | Ratio of total shares owned by institutional investors to total number of shares issued | KLSE *Annual Companies Handbook* 1995/96 |
| Profitability | Return on equity defined as net income to total owners' equity | Company annual report |
| Type of auditors | Big Six vs. Non-Big Six | Company annual report |

TABLE 2

CONTINUED

| Independent variables | Operationalization | Source of information |
|---|---|---|
| Corporate governance characteristics | | |
| Board composition | Ratio of non-executive directors to total number of directors on the board | KLSE *Annual Companies Handbook* 1995/96 and company annual report |
| Cross-directorships | Ratio of directors on the board with directorships in other companies to total number of directors | KLSE *Annual Companies Handbook* 1995/96 and creating data base by keying in names of all directors of public listed companies and then sorting in alphabetical order |
| Role duality | Dichotomous; yes/no | Company annual report |
| Family members on the board | Ratio of family members on the board to total number of directors | Registrar of companies |
| Finance director on the board | Dichotomous; yes/no | Company annual report |
| Chairperson with cross-directorships | Dichotomous; yes/no | KLSE *Annual Companies Handbook* 1995/96 and creating data base by keying in names of all directors of public listed companies and then sorting in alphabetical order |
| Chairperson is non-executive director | Dichotomous; yes/no | KLSE *Annual Companies Handbook* 1995/96 and company annual report |
| Personal characteristics | | |
| Race of chairperson | Dichotomous; bumiputra/non-bumiputra | Registrar of companies and company annual report |
| Race of managing director | Dichotomous; bumiputra/non-bumiputra | Registrar of companies and company annual report |
| Race of finance director | Dichotomous; bumiputra/non-bumiputra | Registrar of companies and company annual report |
| Racial ownership structure | Ratio of bumiputra ownership to total number of shares issued | KLSE *Annual Companies Handbook* 1995/96 |
| Racial composition of directors on board | Ratio of bumiputra directors to total number of directors on the board | KLSE *Annual Companies Handbook* 1995/96 |
| Qualification of directors | Ratio of directors qualified in business or accounting to total number of directors on the board | Registrar of companies, company annual report, KLSE *Annual Companies Handbook* 1995/96, *New Malaysian Who's Who*, other published sources and letters to company secretary |
| Qualification of finance director | Dichotomous; accounting and business or other | Registrar of companies, company annual report, KLSE *Annual Companies Handbook* 1995/96, *New Malaysian Who's Who*, other published sources and letters to company secretary |

### *Data Analysis*

*Models* Multiple regression is used to assess the extent to which variability in the extent of voluntary disclosure is explained by the various corporate governance, cultural and firm-specific characteristics. The correlation matrix was reviewed and variance inflation factors (VIF)[9] computed to assess the extent of any multicollinearity problem. Normality tests based on skewness, kurtosis and K–S Lilliefors were also conducted. An analysis of residuals, plots of the studentized residuals against predicted values as well as the Q–Q plot were conducted to test for homoscedasticity, linearity and normality assumptions. The regression equation is as follows:

$$I = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \ldots + \beta_{31} X_{31i} + \epsilon_i$$

where $I$ = voluntary disclosure index *;

$X_1$ = 1 if the company has role duality; 0 if otherwise;
$X_2$ = 1 if the company has an independent non-executive director as chairperson; 0 if otherwise *;
$X_3$ = 1 if the company has a chairperson with cross-directorships; 0 if otherwise *;
$X_4$ = 1 if the company has a Malay managing director; 0 if otherwise *;
$X_5$ = 1 if the company has a Malay finance director; 0 if otherwise;
$X_6$ = 1 if the company has a Malay chairperson; 0 if otherwise;
$X_7$ = 1 if the company's finance director is trained in accounting/business; 0 if otherwise;
$X_8$ = 1 if the company is in the industrial sector; 0 if otherwise *;
$X_9$ = 1 if the company is in the consumer sector; 0 if otherwise *;
$X_{10}$ = 1 if the company is in the trading sector; 0 if otherwise *;
$X_{11}$ = 1 if the company is in the construction sector; 0 if otherwise *;
$X_{12}$ = 1 if the company is in the plantation/mining sector; 0 if otherwise *;
$X_{13}$ = 1 if the company has multiple listing; 0 if otherwise;
$X_{14}$ = 1 if the company has a Big-6 auditor; 0 if otherwise *;
$X_{15}$ = 1 if the company is involved in foreign activities, 0 if otherwise;
$X_{16}$ = proportion of independent non-executive directors to total directors (%);
$X_{17}$ = proportion of family members to total directors (%) *;
$X_{18}$ = proportion of directors with cross-directorships to total directors (%) *;
$X_{19}$ = proportion of Malay directors to total directors (%) *;
$X_{20}$ = proportion of Malay share ownership to total shares (%) *;
$X_{21}$ = proportion of directors qualified in business/accounting to total directors (%);
$X_{22}$ = total assets (proxy for size) *;

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[9] The VIF indicates a problem if the factor exceeds 10 (Neter *et al.*, 1983; Kennedy, 1992). Since the VIF did not exceed 3.053 for any variable in any of the models, it was concluded that collinearity was not a serious problem.

$X_{23}$ = debt to equity ratio (proxy for gearing);
$X_{24}$ = Herfindahl index (proxy for diversification) *;
$X_{25}$ = number of subsidiaries (proxy for complexity of business) *;
$X_{26}$ = book value of net fixed assets to book value of total assets (proxy for assets-in-place) *;
$X_{27}$ = proportion of top ten shareholders to total shareholders (%) *;
$X_{28}$ = proportion of foreign investors to total shareholders (%) *;
$X_{29}$ = proportion of institutional directors to total shareholders (%) *;
$X_{30}$ = return on equity ratio (proxy for profitability) *;
$X_{31}$ = listing age;
$\beta$ = parameters;
$\epsilon_i$ = error term; and
$i$ = the $i$th observation

Note: $X_1$–$X_3$ = dummy variables for corporate governance factors; $X_4$–$X_7$ = dummy variables for cultural factors; $X_8$–$X_{15}$ = dummy variables for firm-specific factors; $X_{16}$–$X_{18}$ = variables for corporate governance factors; $X_{19}$–$X_{21}$ = variables for cultural factors; $X_{22}$–$X_{31}$ = variables for firm-specific factors; and * = variable used in the reduced regression.

In addition to the full regression (unrestricted) model based on all thirty-one variables, a reduced (restricted) model based on a selection of variables found significant in the full regression model together with evidence from the correlation matrix (see Table 3) was also conducted. For a review of such a procedure see Pindyck and Rubinfeld (1981, pp. 117–20). The reduced (by zero coefficients) regression model included twenty-one independent variables (marked with an asterisk in the previous model) and tests the subset of variables.

An issue of importance relating to the construction of the dependent variable involves equal weighting of disclosure items. Even though the scores and scoring instrument are connected to a numerical continuum associated with the dependent variable, it may not be appropriate to treat raw scores as interval measures since underlying characteristics are more akin to ordinal data. Furthermore, the direction of some of the relationships discussed earlier between the independent and dependent variables is not clear although assumed to be monotonic.

A suggestion made by Iman and Conover (1979, p. 500) was that 'the rank transform approach has an obvious advantage when the dependent variable is a monotonic function of the independent variable(s) and this monotonic relationship is nonlinear in nature'. The procedure they advocate is as follows: given a dependent variable $y$ with $n$ observations, the observations are placed in order and ranked from 1 to $n$, that is, from smallest to largest. Both the dependent and independent variables are ranked so that with $R(y_i)$ being the rank assigned to the $i$th smallest value of $Y$, each independent variable $X_j$ ($j = 1, k$) is replaced with their corresponding ranks 1 to $n$. Tied values are conventionally assigned the mean of the ranks for which they are tied.[10]

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[10] See Cooke (1998).

## Table 3

## CORRELATION MATRIX

| | SIZETA | SIZEAIP | LISTAGE | PROROE | LEVDEQ | HERFIN | NOSUB | INST | FOREIOWN | TOP 10 | COMPDIR | FAMBOD | X-DIRECT | PUTRADIR | PUTRAOWN | QUALDIR | TOTINDEX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SIZETA | 1.000 | .074 | –.035 | .057 | .329 | .177 | .230 | –.048 | .027 | .074 | .265 | –.056 | .288 | .170 | .048 | .068 | .443** |
| SIZEAIP | .074 | 1.000 | –.148 | –.040 | .012 | –.116 | –.149 | .134 | –.039 | .080 | .126 | –.101 | .089 | .047 | .038 | –.063 | .103 |
| LISTAGE | –.035 | –.148 | 1.000 | –.266 | –.143 | .122 | –.053 | .087 | .190 | –.206 | –.277 | –.109 | .011 | –.057 | –.095 | .184 | –.063 |
| PROROE | .057 | –.040 | –.266 | 1.000 | .102 | –.173 | –.072 | .158 | .225 | .309 | .075 | –.029 | .035 | –.130 | –.136 | –.111 | .244** |
| LEVDEQ | .329 | .012 | –.143 | .102 | 1.000 | –.004 | .121 | –.205 | –.020 | .039 | –.012 | .189 | –.129 | .035 | .003 | –.189 | .105 |
| HERFIN | .177 | –.116 | .122 | –.173 | –.004 | 1.000 | .403 | –.219 | –.133 | –.226 | –.021 | .159 | .043 | –.011 | .013 | .213 | .228** |
| NOSUB | .230 | –.149 | –.053 | –.072 | .121 | .403 | 1.000 | –.140 | –.197 | –.186 | .015 | .156 | .019 | –.070 | –.077 | .007 | .196* |
| INST | –.048 | .134 | .087 | .158 | –.205 | –.219 | –.140 | 1.000 | –.046 | .617 | –.115 | –.195 | .191 | .206 | .154 | –.020 | .247** |
| FOREIOWN | .027 | –.039 | .190 | .225 | –.020 | –.133 | –.197 | –.046 | 1.000 | –.030 | .037 | –.086 | –.074 | –.211 | –.318 | .154 | .054 |
| TOP 10 | .074 | .080 | –.206 | .309 | .039 | –.226 | –.186 | .617 | –.030 | 1.000 | .030 | –.184 | .194 | .188 | .155 | –.157 | .309** |
| COMPDIR | .265 | .126 | –.277 | .075 | –.012 | –.021 | .015 | –.115 | .037 | .030 | 1.000 | .054 | .366 | .084 | –.066 | –.025 | .123 |
| FAMBOD | –.056 | –.101 | –.109 | –.029 | .189 | .159 | .156 | –.195 | –.086 | –.184 | .054 | 1.000 | –.130 | –.257 | –.163 | –.083 | –.179* |
| X-DIRECT | .288 | .089 | .011 | .035 | –.129 | .043 | .019 | .191 | –.074 | .194 | .366 | –.130 | 1.000 | .088 | .136 | –.121 | .311** |
| PUTRADIR | .170 | .047 | –.057 | –.130 | .035 | –.011 | –.070 | .206 | –.211 | .188 | .084 | –.257 | .088 | 1.000 | .492 | .110 | .266** |
| PUTRAOWN | .048 | .038 | –.095 | –.136 | .003 | .013 | –.077 | .154 | –.318 | .155 | –.066 | –.163 | .136 | .492 | 1.000 | –.022 | .194* |
| QUALDIR | .068 | –.063 | .184 | –.111 | –.189 | .213 | .007 | –.020 | .154 | –.157 | –.025 | –.083 | –.121 | .110 | –.022 | 1.000 | .094 |
| TOTINDEX | .443** | .103 | –.063 | .244** | .105 | .228** | .196* | .247** | .054 | .309** | .123 | –.179* | .311** | .266** | .194* | .094 | 1.000 |

** significant at 1% level. * significant at 5% level.

An extension of the rank regression method which retains the advantages of such an approach but has additional advantages is to use normal scores, a method proposed by Cooke (1998). The transformation he proposes is from actual observations to the normal distribution by dividing the distribution into the number of observations plus one regions on the basis that each region has equal probability. This method is referred to as the Van der Waerden approach (Van der Waerden, 1952, 1953).[11] In effect, ranks are being substituted by scores on the normal distribution and so the normal scores approach can be considered to represent an extension of the rank method.[12] Empirical analysis reported here uses normal scores for both the dependent variable and continuous independent variables and thereby transforms to normality.

The main advantage of replacing ranks by normal scores is that the resulting tests have exact statistical properties because significance levels can be determined, the $F$ and $t$-tests are meaningful, the power of the $F$ and $t$-tests can be used, and the regression coefficients derived using normal scores are meaningful. A further characteristic is that the normal scores approach offers a means whereby a nonnormal dependent variable can be transformed into normality and as such offers a further advantage over ranks. A normally distributed dependent variable may imply that errors are normally distributed by the assumptions of OLS.[13]

The normal scores approach has the same advantages as ranks when there are problems of monotonicity and nonlinearity. Normal scores preserve monotonicity in relationships, as do ranks, with higher ranked values of the independent variables being associated with higher ranked values of the dependent variables (the converse is also true). In addition, when there is nonlinearity with data concentration, normal scores disperse that concentration, an advantage also gained when using ranks.

## RESULTS

### *Descriptive Statistics*

Tables 4 and 5 provide descriptive statistics of the voluntary disclosure index and the continuous independent variables. The mean aggregate voluntary disclosure index (VDI) is 31.3 per cent and the range is from 6 per cent to 70 per cent, but

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[11] The van der Waerden approach may be summarized as = $r/(n+1)$. Alternatives include Blom = $(r-3/8)/(n+1/4)$ (see Blom, 1958); Rankit = $(r-1/2)/n$ (see Chambers *et al.*, 1983), and Tukey = $(r-1/3)/(n+1/3)$ (see Tukey, 1962).

[12] For example, if there are six observations the normal distribution would be divided into seven equally probable parts so that the original values are replaced by normal scores (here −1.0676, −0.5659, −0.1800, 0.1800, 0.5659, 1.0676) rather than the ranks 1, 2, . . . , 6. These figures were derived using SPSS and represents one approach to deriving normal scores. An alternative approach would be based on expected values but requires substantial computation although tables are available such as in Lindley and Scott (1984).

[13] If the error term is found to be normally distributed the dependent variable will also be normally distributed. The converse is not necessarily true.

TABLE 4

DESCRIPTIVE STATISTICS: VOLUNTARY DISCLOSURE INDEX (UNTRANSFORMED)

| | | | |
|---|---|---|---|
| Mean | 0.313 | Skewness | 0.426 |
| Standard deviation | 0.139 | SE skewness | 0.206 |
| SE mean | 0.012 | Kurtosis | –0.091 |
| Minimum | 0.060 | SE kurtosis | 0.408 |
| Maximum | 0.700 | Z-test skewness | 2.067 |
| K–S Lilliefors | 0.074 | Z-test kurtosis | –0.223 |
| K–S Significance | 0.060 | | |

TABLE 5

DESCRIPTIVE STATISTICS OF CONTINUOUS INDEPENDENT VARIABLES (UNTRANSFORMED)

| Variables | Mean | Median | Minimum | Maximum | SD |
|---|---|---|---|---|---|
| Corporate governance characteristics | | | | | |
| Board composition (%) | 0.45 | 0.43 | 0.20 | 0.82 | 0.12 |
| Family members on board (%) | 0.14 | 0.00 | 0.00 | 0.67 | 0.21 |
| Directors with cross-directorships (%) | 3.24 | 3.00 | 0.00 | 8.00 | 2.14 |
| Cultural characteristics | | | | | |
| Malay directors (%) | 0.47 | 0.40 | 0.00 | 1.00 | 0.26 |
| Malay shareholdings (%) | 0.27 | 0.23 | 0.00 | 0.97 | 0.23 |
| Qualification of directors (%) | 0.43 | 0.43 | 0.00 | 0.88 | 0.17 |
| Firm-specific characteristics | | | | | |
| Size (TA) | 12.93 | 12.95 | 8.29 | 16.29 | 1.26 |
| Assets-in-place (%) | 0.33 | 0.29 | 0.01 | 0.90 | 0.23 |
| Listing age | 15.53 | 16.00 | 1.00 | 33.00 | 9.90 |
| Profitability (ROE %) | 0.09 | 0.09 | –1.03 | 0.32 | 0.13 |
| Gearing (debt/equity %) | 0.20 | 0.08 | –2.00 | 1.83 | 0.30 |
| Diversification (Herfindahl) | 1.34 | 1.34 | 0.00 | 6.77 | 1.31 |
| Number of subsidiaries | 14.55 | 9.00 | 0.00 | 86.00 | 15.89 |
| Institutional investors (%) | 0.15 | 0.15 | 0.01 | 0.79 | 0.15 |
| Foreign investors (%) | 0.21 | 0.17 | 0.01 | 0.81 | 0.17 |
| Top ten shareholders (%) | 0.68 | 0.71 | 0.06 | 0.95 | 0.15 |

the VDI is not normally distributed as indicated by standard tests on skewness and kurtosis and was further supported by the non-parametric Kolmogorov–Smirnov normality test (or K–S Lilliefors).[14] As such, the dependent and continuous independent variables were transformed to normal scores.

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[14] K–S Lilliefors with significance of >.05 indicates that the distribution is approximately normal.

Table 6 summarises the regression[15] results using normal scores for these variables. The regression produced an adjusted $R^2$ of 0.463.[16] Two corporate governance variables were found to be significant. An independent non-executive director as chairperson is significant at the 1 per cent level but the relationship is negative. Contrary to our expectation, this indicates that companies with such a chairperson disclose less than companies with a chairperson who is an executive director. This seems to contradict agency theory which suggests that a non-executive chairperson can play a more independent role in influencing disclosure because of their influence and power.

The proportion of family members on the board was found to be significant at the 5 per cent level and the negative coefficient indicates that companies with more family members on the board disclose less, a result consistent with the relationship suggested by Ahmed and Nicholls (1994) and our expectation. A possible explanation for lower disclosure when many family members sit on boards might be due to less demand for published information as owners have better access to internal information.

Despite the strong belief by respondents of an association between disclosure and cultural characteristics (especially with regard to race) expressed during the interviews, none of the cultural variables was found to be significant.

Out of seventeen firm-specific variables used as control variables in the model, four were found to be significant at the 5 per cent level and two at the 1 per cent level. Assets-in-place was found to be significant (5 per cent level) and positively related to disclosure as expected, but contrary to the finding by Hossain *et al.* (1994) for Malaysian listed companies. This difference may be due to the fact that Hossain *et al.* used market value of assets as their measure of assets-in-place whereas book value of assets is used here.

As for ownership structure based on the proportion of shares held by the top ten shareholders (reflecting diffusion), results indicate a significant (5 per cent level) positive relationship. This finding was as expected and again contradicts the findings of Hossain *et al.* (1994), who found a significant negative relationship for Malaysian listed companies. This implies that companies choose to disclose less perhaps to avoid losing control. The significant (5 per cent level) positive relationship between voluntary disclosure and foreign ownership (reflecting concentration) was in line with expectations and supports the argument that obtaining foreign funds means a greater need for disclosure to monitor actions by management. However, the result was inconsistent with the study by Soh (1996). The difference in results found here compared to Soh (1996) and Hossain *et al.* (1994) may be due to changes in disclosure practice over time.

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[15] Four separate regression models based on different transformations of the dependent and independent variables were run and the normal-scores approach produced the best fit. These results may be obtained from the authors.

[16] Although the adjusted $R^2$ may be considered low, it was much higher than that reported in two previous Malaysian studies by Hossain *et al.* (1994) and Soh (1996) which were 28.6 per cent and 29.6 per cent respectively.

TABLE 6

REGRESSION ANALYSIS OF DETERMINANTS OF VOLUNTARY DISCLOSURE BASED ON NORMAL SCORES

| Independent variables | Predicted sign | Coefficients | *t*-statistics | VIF |
|---|---|---|---|---|
| Corporate Governance | | | | |
| Board composition | + | –0.117 | –1.739 | 1.154 |
| Family members on the board | – | –0.225 | –2.267* | 1.159 |
| Role duality | – | 0.180 | 0.549 | 1.415 |
| Chairperson is NED | + | –0.403 | –2.701** | 1.506 |
| Directors with cross-directorships | + | 0.107 | 1.195 | 1.930 |
| Chair with cross-directorships | + | 0.250 | 1.533 | 1.820 |
| Cultural | | | | |
| Ratio of Malay directors | – | 0.135 | 1.263 | 2.901 |
| Malay finance director | – | –0.070 | –0.426 | 1.256 |
| Malay chairperson | – | 0.235 | 1.237 | 2.114 |
| Malay managing director | – | 0.059 | 0.310 | 2.258 |
| Malay shareholdings | – | 0.026 | 0.320 | 1.740 |
| Qualification of directors | + | 0.019 | 0.274 | 1.261 |
| Qualification of finance director | + | –0.197 | –0.898 | 1.628 |
| Firm-specific | | | | |
| Size (TA) | + | 0.166 | 1.559 | 2.939 |
| Gearing (D/E) | + | 0.074 | 0.938 | 1.589 |
| Diversification | + | 0.181 | 1.938 | 1.846 |
| Complexity of business | + | 0.143 | 1.561 | 2.060 |
| Assets-in-place | – | 0.178 | 2.413* | 1.403 |
| Top ten shareholder | + | 0.183 | 2.288* | 1.665 |
| Foreign investors | + | 0.153 | 2.009* | 1.498 |
| Institutional investors | + | –0.007 | –0.105 | 1.382 |
| Profitability (ROE) | + | 0.231 | 2.697** | 1.891 |
| Consumer | | –0.645 | –2.562* | 2.052 |
| Industrial | | –0.578 | –2.725** | 2.325 |
| Trading | +/– | –0.086 | –0.375 | 2.344 |
| Plantation and Mining | | –0.221 | –0.830 | 3.053 |
| Multiple listing status | + | 0.295 | 1.015 | 1.398 |
| Type of auditor | + | 0.136 | 0.904 | 1.337 |
| Listing age | – | 0.032 | 0.403 | 1.570 |
| Foreign activities | + | 0.069 | 0.414 | 1.753 |
| Constant | | 0.195 | 0.649 | |
| Std Error | 0.711 | | | |
| *F* value | 4.833 | | | |
| Sig. *F* | 0.000 | | | |
| $R^2$ | 0.583 | | | |
| Adjusted $R^2$ | 0.463 | | | |

** significant at 1% level. * significant at 5% level.

*Note*: The coefficients of the excluded dummy variables are all 1.000 since they act as benchmarks for the included dummies. The excluded dummy variable for industry sector is construction/property sector.

With respect to industry type, companies in all sectors were found to disclose less than the construction sector (the excluded dummy variable) with the lowest coefficient being the consumer sector. This finding is inconsistent with that of Soh (1996) who found, for all three years studied, that Malaysian companies in the trading sector disclosed relatively more than companies in other sectors. A possible explanation for this finding may be political motivation because during the period of this study, the nation's mantra was to 'think big', resulting in the growth of prestigious large projects with priority awarded to local construction firms. Nevertheless, trading companies disclosed more than all other sectors with the exception of construction firms.

The significance of the profitability variable (1 per cent level) is consistent with previous studies (e.g., Cerf, 1961; Singhvi, 1967; Abu-Nasar and Rutherford, 1994; Soh, 1996[17]). This is in line with the signalling hypothesis which argues that companies with good news are more likely to disclose additional information (Ross, 1979).

Results of the reduced regression are presented in Table 7. The adjusted $R^2$ for the reduced regression was 0.479, slightly higher than the previous regression, and is not surprising since the unrestricted model contained several variables that were not significant. Thus, the unrestricted model is mis-specified to some extent. As in the full regression model, the proportion of family members on boards and an independent non-executive director as chairperson were found to be significant (5 per cent level) and negatively related to disclosure. However, the striking result in the reduced regression model is that one cultural variable—proportion of Malay directors on the board—is significant at the 5 per cent level and the coefficient is positive, contrary to our expectations based on the Hofstede–Gray framework. According to their framework, societal values of the Malay are in congruence with the accounting value and practice of being secretive in disclosure (see Table 1). The result implies that other intervening factors that have not been captured in this study, rather than ethnic values *per se*, could be driving the result. Such factors include government's policies, economic incentives and religion. Five firm-specific variables (*viz.* size [total assets], diversification [Herfindahl index], consumer sector, ownership by top ten shareholders, and foreign investors) were significant at the 5 per cent level, while assets-in-place, profitability and industrial sector were found to be significant at the 1 per cent level.

## CONCLUSIONS

This study has examined whether the extent of voluntary disclosure in annual reports of Malaysian listed companies is associated with three groups of variables: corporate governance, cultural and firm-specific (control variables) attributes. Results based on the full regression model with thirty-one variables indicated that only two groups of variables, namely corporate governance and firm-specific

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[17] Soh (1996) in his study of Malaysian listed companies for the period 1991 to 1993 found profitability to be significant only in 1991.

### Table 7

### REDUCED REGRESSION ANALYSIS OF DETERMINANTS OF VOLUNTARY DISCLOSURE

| Independent variables | Predicted sign | Coefficients | *t*-statistics | VIF |
|---|---|---|---|---|
| Corporate governance | | | | |
| Family members on the board | – | –0.237 | –2.591* | 1.399 |
| Directors with X-holdings | + | 0.070 | 0.802 | 1.651 |
| Chairperson is NED | + | –0.327 | –2.429* | 1.258 |
| Chair has cross-directorships | + | 0.284 | 1.847 | 1.666 |
| Cultural | | | | |
| Ratio of Malay directors | – | 0.182 | 2.061* | 2.048 |
| Malay shareholdings | – | 0.055 | 0.705 | 1.598 |
| Malay managing director | – | –0.029 | –0.162 | 2.029 |
| Firm-specific | | | | |
| Size (TA) | + | 0.197 | 2.079* | 2.384 |
| Assets-in-place | – | 0.190 | 2.854** | 1.184 |
| Diversification | + | 0.188 | 2.139* | 1.685 |
| Profitability | + | 0.224 | 2.728** | 1.787 |
| Complexity of business | + | 0.156 | 1.809 | 1.896 |
| Institutional investors | + | 0.120 | 0.299 | 1.224 |
| Foreign investors | + | 0.177 | 2.439* | 1.405 |
| Top-ten shareholder | + | 0.169 | 2.203* | 1.560 |
| Type of auditor | + | 0.156 | 1.107 | 1.211 |
| Consumer | +/– | –0.590 | –2.513* | 1.842 |
| Industrial | | –0.574 | –2.988** | 1.996 |
| Trading | | –0.113 | –0.554 | 1.896 |
| Plantation and mining | | –0.246 | –1.074 | 2.324 |
| Constant | | 0.239 | 1.170 | |
| Std. Error | 0.700 | | | |
| *F* value | 7.341 | | | |
| Sig. *F* | 0.000 | | | |
| $R^2$ | 0.554 | | | |
| Adjusted $R^2$ | 0.479 | | | |

** significant at 1% level. * significant at 5% level.
*Note*: The coefficients of the excluded dummy variables are all 1.000 since they act as benchmarks for the included dummies. The excluded dummy variable for industry sector is construction/property sector.

characteristics, were associated with the extent of disclosure. The significance of the two corporate governance variables (i.e., family members sitting on board and non-executive chairman) identified indicates the importance of these variables as determinants of voluntary disclosure. Specifically, the chairperson as non-executive director is negatively associated with the extent of voluntary disclosure and has the highest regression coefficient. This seems to contradict agency theory which suggests that a non-executive chairperson is needed as a check and balance mechanism. The finding suggests that a non-executive chairperson, as agent, obtains greater utility by keeping private information secret. As such, the relevant authorities in Malaysia which recommend companies to have a non-executive chairperson as part of 'good corporate governance practice' might need to reconsider their recommendation, particularly if the non-executive chairperson is making a private gain.

Although results based on the full regression model do not identify any of the cultural variables as significant, the reduced regression model shows otherwise. A cultural factor (race), measured as the proportion of Malay directors on the board, was found to be significant. The findings of no significant association between disclosure and any of the cultural variables in the full model supports the suggestion of culture-free theorists that, over time, societal values converge resulting from technological development. However, the reduced model seems to support arguments that disclosure practice cannot be culture-free. Since all Malays are Muslims, a possible explanation for higher disclosure (a result which contradicts the Hofstede–Gray hypothesis) in firms dominated by Malay directors may be attributed to Islamic business ethics which encourage transparency in business (Gambling and Karim, 1991) but this needs further investigation. Another possible reason is to legitimise their (Malay directors') role and please the various interest groups including the government to ensure a continued influential voice at both governmental and institutional levels.

An alternative interpretation is that the finding reflects a response to 'traditional hostility towards the Chinese who, with their entrepreneurial skills, have tended to exert economic influence out of proportion to their numbers' (Maidment and Mackerras, 1998, p. 6). Criticism of their economic influence may elicit a secrecy response. Thus, contrary to expectation, a non-executive chairperson may be resorting to secrecy, and the Chinese in Malaysia likewise. Perhaps governmental focus on race, ethnicity and language in countries such as Malaysia and Fiji will solicit responses to secrecy in business from those who feel threatened.

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## APPENDIX

## LIST OF DISCLOSURE ITEMS EXAMINED IN THE CURRENT STUDY

- General corporate information
  - Mission statement
  - Brief history of company
  - Financial highlights statement—2 years
  - Financial highlights statement—>3 years
  - Description of corporate structure
  - Major plants, warehouses, projects
- Information about directors
  - Picture of chairperson only
  - Picture of all directors
  - Academic qualifications of directors
  - Position or office held by executive directors
  - Identification of senior management
  - Functions of senior management
- Corporate strategy
  - Statement of strategy and objectives—general (past)
  - Statement of strategy and objectives—general (future)
  - Statement of strategy and objectives—financial (past)
  - Statement of strategy and objectives—marketing (past)
  - Statement of strategy and objectives—marketing (future)
  - Impact of strategy on past results
  - Impact of strategy on future results
- Capital market data
  - Stock exchanges
  - Volume of shares traded (trend)
  - Volume of shares traded (year end)
  - Share price information (trend)
  - Share price information (year end)
  - Domestic and foreign shareholdings

  - Distribution of shareholdings by type of shareholders
- Research and development
  - New product development
- Future prospects
  - General discussion of future industry trend
  - Discussion of specific external factors affecting company's prospects (economy, politics, technology)
  - Discussion of company's prospects (general)
  - Qualitative forecast
  - Forecasts assumptions
  - Order book or backlog information
  - Index (selling prices, quantity sales, raw materials prices)
- Social reporting and value-added information
- *I: Community involvement*
  - General philanthropy
  - Participation in government social campaigns
  - Community programs (health & education)
- *II: Environmental*
  - Environmental policies
- *III: Employee information*
  - Employees' appreciation
  - Recruitment problems
  - Picture of employees' welfare
  - Discussion of employees' welfare
  - Profit sharing schemes policy
  - Number of employees
  - Corporate policy on employee training
  - Nature of training
- *IV: Product or service information*
  - Discussion of major types of product
  - Pictures of major types of product
  - Improvement in product quality
  - Improvement in customer service
  - Distribution of marketing network for finished products—foreign market
  - Customer awards/ratings received
- Financial review information
- *I: Historical summary*
  - Financial summary 3+ years
- *II: Financial ratios*
  - Profitability ratios
- Acquisitions and disposals
  - Reasons for the acquisitions
  - Effects of acquisition on past results
  - Effects of acquisition on future results
  - Reasons for disposal
  - Effects of disposal on past results
  - Amount of consideration realised
- Segmental reporting
  - One line of business production data
  - All lines of business production data
  - Geographical capital expenditure
  - Discussion of competitors—qualitative
  - Market share analysis—qualitative

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# An Analysis of Post-Expectation Gap Voting Behaviour by the ASB

In the United States, auditing standards are promulgated in the private sector by the Auditing Standards Board (ASB), which is a committee of the American Institute of Certified Public Accountants (AICPA). In contrast to the Financial Accounting Standards Board (FASB), ASB members are not required to sever ties with their firms (parent organizations). As a result, ASB members have an opportunity to act as agents of their parent organizations in casting their votes for proposed Statements on Auditing Standards (SASs). McEnroe (1994) found such behaviour to exist in relation to the 'expectation gap' SASs and suggested as an area of future research to ascertain if this type of voting behaviour would continue on subsequent SASs. Accordingly, this research investigates the votes cast by the ASB members on the post-expectation gap SASs in an effort to determine if 'agency' voting has continued. The results support the proposition that agency voting behaviour is still prominent on the part of the ASB, even after repeated calls for its reformulation.

**Key words:** Auditing; Expectations gap; Lobbying; Standards.

Auditing and audit standard setting are again under close scrutiny. The sagas at Enron in the U.S. and HIH are salient reason for the present examination of whether private or public standard-setting bodies are optimal. As in most countries, auditing standards are promulgated in the United States by a professional body of accountants (Needles, 1997, p. 23).[1] In the U.S., this body is a committee of the American Institute of Certified Public Accountants (AICPA) and its official title is the Auditing Standards Board (ASB). The audit standards it issues are referred to as Statements on Auditing Standards (SASs) and must be adhered to by members of the AICPA. This promulgation process has resided in the private sector in the U.S. since 1939.

There has been much discussion in the accounting literature in the U.S., the U.K., Australia and elsewhere involving the 'expectation gap'; the difference

[1] According to Needles (1997, p. 23), it is only in the case of a few countries where auditing standards are influenced by national laws; Germany is one such example. Besides the U.S., Australia and Italy rely entirely on professional bodies for the establishment of auditing standards. The United Kingdom and the Netherlands, conversely, utilize a combination of legal and professional audit standards.

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between what the informed public expects the efficacy and the dimensions of an audit to be, versus what auditors perceive their responsibilities to be in performing the attest function (Guy and Sullivan, 1988; AICPA, 1993; Humphrey *et al.*, 1993; Sikka *et al.*, 1998; McEnroe and Martens, 2001). In 1988 the ASB attempted to reduce the lack of symmetry between these two groups by issuing a series of SASs (53–61), referred to collectively as the 'expectation gap' SASs.

In a previous paper, McEnroe (1994) examined the voting behaviour of the ASB members involving the issuance of the expectation gap SASs (EGSASs). More specifically, he found that agency relationships existed in the voting patterns of certain ASB members and the firms that employ them.[2] He also found that there was often a strong correlation between an ASB member's reason listed for an objection to a SAS and his/her parent organization's position as expressed in a comment letter submitted to the ASB. Thus, McEnroe suggested (p. 130) that an appropriate area of future research was to ascertain if such voting behaviour would continue on subsequent SASs.

Hence, this article replicates McEnroe (1994) and also extends it by also examining the voting behaviour of ASB members as a function of whether they are involved in the development of their firm's audit policy. Since the issuance of the EGSASs, there has been additional attention directed to the auditing standard-setting process in the U.S., in the form of criticisms of the process itself and/or a concurrent call for a restructuring of the ASB (National Commission, 1987; Marsh, 1988; Arens, 1993; McEnroe, 1994; *CPA Journal*, 1995; GAO, 1996; POAE, 2000).[3] This public scrutiny of the system by which auditing standards are promulgated serves, in part, as additional motivation for this research.

## INSTITUTIONAL ENVIRONMENT OF THE ASB

Over a decade has passed since the issuance of the EGSASs in 1988, and during that time several noteworthy developments have occurred in the U.S. in the area of auditing standards setting. These events range from a change in the size of the ASB to a decrease in the amount of dissensions recorded by board members when voting on auditing standards. Although these changes are not directly related to the issue of agency voting, they are discussed in order to provide the reader with a perspective of the auditing standard-setting environment in the EGSAS versus the post-expectation gap SASs (PEGSAS) time periods, including the composition of the ASB. Its inclusion is intended to provide the requisite information to address whether there were events or other developments that might affect the degree of agency voting between these two periods.

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[2] In this paper an agency relationship refers to 'a person or thing that acts or has the power to act' (Random House, 1984, p. 25, second definition) and in this setting connotes lobbying for the agenda of the parent organization through the ASB member's voting behaviour.

[3] Although the Treadway Committee (National Commission, 1987) report technically preceded the issuance of the EGSASs, it was released after the exposure drafts to the EGSASs were issued, and as such is included in these citations.

First, the size of the ASB has been reduced from twenty-one to fifteen members, due to mergers involving former Big Eight firms, and to maintain the balance between large and small firm representation (Holstrum, 1989, p. 8). Under the twenty-one member board that existed until SAS 64 (1990), the national representatives comprised the Big Eight and two other firms (Grant Thornton and Laventhol & Horwath), there were ten small and regional firm representatives, and the residual seat was maintained by an academic. When the ASB was reduced to seventeen members due to mergers, the ASB then was comprised of seven national firms (the Big Six and Grant Thornton), nine other non-national accounting firms and an academic. This balance remained until SAS 72 (1992), with the same national firms occupying seven seats as compared to a total of seven small and regional firms. The composition was changed once again in 1995 with the issuance of SAS 75, when a government representative replaced one of the small/regional representatives, thus making it seven national firms versus six small and regional firms. Accordingly, national firms have historically represented about 50 per cent of the ASB members from public accounting firms. With the very possible existence of only the Big Four nationals, it is interesting to ponder what will be the size of the ASB in the near future.

A second development is that there seems to be significantly less general interest in the PEGSASs, as measured by the number of comment letters submitted to the ASB in response to the exposure drafts (EDs) of these SASs. For example, Geiger (1989, p. 43) stated that a representative number of comment letters to the ED of an EGSAS was eighty to 120, and that the total letters for the nine expectation gap SASs was 1,105. In contrast, for the seventeen most recent SASs as of this writing (SAS 71–87), a total of 438 letters were written, for an average submission of about twenty-six letters.[4] Furthermore, with respect to the EGSASs, a total of 127 letters were sent to the ASB by organizations (parent organizations) who had an employee sitting on the ASB, while the total votes cast by the ASB members on the passage of these SASs were 189.[5] As a result, there was written input from the parent organizations on about 67 per cent of the votes cast on these auditing standards. In the twenty-six subsequent SASs (62–87), only 114 parent organization comment letters were sent to the ASB in relation to 416 votes cast, for a parent input percentage of only about 27 per cent, which is less than half the rate on the EGSASs.

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[4] According to a former AICPA employee involved in the auditing standard-setting process, when the pre EGSASs were issued, the volume of comment letters submitted to the EDs of these SASs varied, but in general were much fewer in number than those received for the EGSASs. In fact, they only averaged about ten, with about twenty to twenty-five being the high end. In some cases, none were sent. There were exceptions, however, for as Dillard and Jensen report (1983, p. 788), 453 comment letters were received to an ED involving a proposed revision of language in the audit report. Accordingly, the current letter submission is a bit greater than during the pre EGSAS era, which might be partially explained by the ease of submitting comments via electronic mail.

[5] As a matter of course, Touche Ross did not submit comment letters on EDs. After the firm's merger with Deloitte Haskins & Sells who, as a practice, submitted comments, letters were submitted by the new entity, Deloitte & Touche.

TABLE 1

SAS VOTES

| | Expectation gap (53–61) | | Post-expectation gap (62–87) | |
|---|---|---|---|---|
| Vote type | Number | % | Number | % |
| Assent | 152 | 80.4 | 393 | 94.5 |
| Assent with qualification | 19 | 10.1 | 21 | 5.0 |
| Dissent | 18 | 9.5 | 2 | .5 |
| Total | 189 | 100% | 416 | 100% |
| | $X^2 = 39.95$, 2 d.f., $p < .005$ | | | |
| Comment letter position | | Parent organization letters | | |
| For SAS | 99 | 77.9 | 111 | 97.4 |
| Against SAS | 28 | 22.1 | 3 | 2.6 |
| Total | 127 | 100% | 114 | 100% |
| | $X^2 = 20.40$, 1 d.f., $p < .005$ | | | |

A third change in the auditing standard-setting climate concerns the lack of contentiousness in the passage of the PEGSASs as measured by the voting behaviour of the board members. An ASB member may vote in one of three ways: assent, assent with qualification, or dissent.[6] If an assent with qualification or dissent vote is cast, the ASB member must provide a reason for his/her protest, which is published when the SAS is issued.

This trend is illustrated in Table 1 which contains two data sets: a description of the types of votes cast for the EGSASs and the PEGSASs, and the position of the parent organization regarding the proposed SAS for these same time periods. A review of the information contained in the top part of the table indicates that for the EGSASs (53–61), ASB members cast both assent with qualification and dissent votes at a rate of about 10 per cent, resulting in a 'protest' percentage of almost 20 per cent (19.6 per cent). However, in the PEGSASs (62–87), less than 1 per cent of the votes were cast as dissents and the assent with qualification votes were recorded at about 5 per cent. As a result, the degree of protest dropped to 5.5 per cent. A chi square test of the two SAS groups by the three vote types was significant at the < .005 level, indicating that the patterns of the two series of votes (EGSAS vs PEGSAS) are not homogeneous. A review of the data in the second part of Table 1 reveals a similar pattern. For the EGSASs, about 22 per cent of the parent organization letters (28/127) indicated opposition to the ED, whereas for the PEGSASs only 2.6 per cent were against the proposed SAS (3/114). A chi square test score of 20.4 is significant at a level of < .005, also indicating that the two series of parent organization positions in the comment letters are not homogeneous. Again, as in the case of the votes cast by the ASB members, the PEGSASs did not engender as much negative reaction as did the EGSASs. These two exercises, then, support the proposition that the PEGSASs were more well-received by the ASB members and their parent organizations than the EGSASs.

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[6] A two-thirds majority of either type of assent vote is necessary for the passage of an SAS.

A possible explanation for these findings is that in the overall auditing standard-setting climate, the PEGSASs might be viewed as, in balance, being less important than the well-publicized EGSASs. Concomitantly, the publicity surrounding the EGSASs might have engendered acute interest by the financial community in the EGSASs' EDs, which, in turn, may have caused the members of the ASB to debate the perceived merits of the EDs' provisions more intensely before they cast their votes on the final standards vis a vis those of the PEGSASs.

Having reviewed these developments, the next section discusses criticisms of the auditing standard-setting process and calls for a reorganization of the ASB, both in the period surrounding the release of the EGSASs and from that time to the present. The next section also discusses the issue of agency voting.

## CRITICISMS OF THE ASB AND THE AUDITING STANDARD-SETTING PROCESS

Although the ASB and the promulgation of auditing standards does not receive the degree of attention and criticism afforded the FASB,[7] the board has not been immune to scrutiny. Although this section will focus on criticisms of the ASB over the last decade, some of the more noteworthy criticisms and/or calls for restructuring of the ASB prior to the release of the EGSASs occurred in the late 1970s, about a decade before their passage. These earlier criticisms originated from two separate investigations of the accounting profession by Congress; one chaired by Representative John Moss (U.S. House, 1976) and another chaired by Senator Lee Metcalf (U.S. Senate, 1977).

In regards to more recent attention regarding the ASB, the EDs of the EGSASs were issued in February 1987. About seven months later, the National Commission on Fraudulent Financial Reporting (the Treadway Commission) criticized the ASB and the auditing standard-setting process for issuing standards that were deemed by that group to be too narrow. As a result, the Treadway Commission concluded that auditing standards issues should 'reflect a broad range of needs, serving public and private interests' (National Commission, 1987, p. 60). Instead of a board composed of mostly public accountants, the commission suggested that the ASB be reformulated to have an equal number of public accountants and outside members (those not in public accounting). Under this model, although the

[7] See, for example, Berton and Ricks (1988), Berton (1996a and 1996b), Lowenstein (1996, 1997), and Zweig and Foust (1997).

AICPA would select the ASB members, their appointment would be based on 'personal expertise and qualifications, and *not on the basis of constituencies*' (p. 61, emphasis added) other than those determined for outside members.

In an interview conducted the month the EGSASs were issued (April 1988), Hugh Marsh, a member of the Treadway Commission, stated that this was the most controversial recommendation involving the entire public accounting sector and that the chairman of the AICPA was speaking against it at public forums (Marsh, 1988, p. 36). Marsh added that the resistance to the proposed restructuring came 'entirely from upper levels of the accounting profession' and was one of the 'key issues' in the response to the exposure draft by the chairmen of the Big Eight accounting firms (p. 37). He stated that the firms were resistant to the idea of significant participation on the ASB by others, which the Treadway Commission had defined as 50 per cent. The Treadway Commission stated that this percentage was needed to attract knowledgeable individuals with the requisite years of training, who would not be willing to serve if they were 'only token members' (p. 37). Marsh also stated that the Treadway Commission argued strongly that participation by non-practising members would serve to significantly 'enhance the credibility' of the auditing standard-setting process and 'take away some of the secrecy inherent in a standards setting group which is totally within the practicing profession' (p. 36).

In a recent related matter in response to the Enron collapse, SEC Chairman Harvey Pitt proposed a new accounting oversight entity, 'dominated by public members', that would have the power to perform investigations and publicize the results, bring disciplinary actions against audit firms and their employees, and bar individuals and firms from performing audits. Lynn Turner, the immediate former Chief Accountant of the SEC, stated that the proposal 'falls way short'. Turner stated that the new body should choose its members from outside the industry and have the power to establish auditing standards (Smith and Schroeder, 2002, p. C15).

Alvin Arens (Arens, 1993), a former ASB member, expressed a concern that the ASB was not more widely represented by various constituent groups and that the promulgated standards were mainly driven by the liability concerns of the audit practitioners who comprised most of the board. Arens also observed that the members of the ASB are selected by the AICPA Vice-President of Auditing Standards and the ASB Chair, except for the (then) Big Six members, who are selected by their firms. This power, Arens states, places these two individuals in a position to influence significant auditing standards by whom they select as members. These same two persons, according to Arens, almost always set the agenda and thus control what issues the board addresses. Accordingly, Arens (and several other ASB members) noted that it might be desirable to have the ASB agenda set by a broader group, including users of financial statements (p. 37). Arens also expressed a concern that the ASB is not as well represented by constituent groups as 'may be desirable for effective standard-setting' (p. 47). Furthermore, Dan Guy, then Vice-President, Professional Standards and Services of the AICPA, acknowledged 'there are some observers of the profession who believe' that a smaller, full time board, perhaps even separate from the AICPA, might better serve the public interest (*CPA Journal*, 1995, p. 12).

Furthermore, the Government Accounting Office (GAO) issued a report involving the status of recommendations made to the accounting profession over the past two decades by major study groups (GAO, 1996). A significant portion of the report focused on the auditing standard-setting process. The GAO observed, in agreement with the Securities and Exchange Commission (SEC) Chief Accountant, that 'opportunity exists in setting auditing standards to better meet the public interest' by appointing more knowledgeable non-public accounting practitioners to the ASB (GAO, 1996, p. 123). The matter is again a focal point given the post-Enron debate regarding what should be the government's response.

More recently, the Panel on Audit Effectiveness (POAE, 2000) issued a report containing recommendations for improving the quality of audits. Chaired by Shaun O'Malley, the panel was formed by the Public Oversight Board (POB) at the request of the SEC and was charged with examining the current audit model. In the report, the POAE observed, 'While the auditing profession's system of voluntary self regulation is extensive, it suffers from certain limitations, some of which are inherent in any voluntary system' (p. 128). One of the limitations cited was a 'lack of sufficient public representation on the various self-regulatory bodies' (p. 128). As a result, it recommended that a formal charter for the POB be constituted that would award it the authority to oversee the activities of the ASB (as well as several other committees). In this capacity, the POB would approve all appointments to the ASB (p. 140). The authority was subsequently granted the POB in 2001. As such the POB was to be consulted on all nominations to the ASB and jointly approve the appointment of the ASB's chair with the AICPA Board. It would also evaluate the effectiveness of the ASB, including the qualifications and performance of the board members. However, the POB unexpectedly voted itself out of existence as a protest in response to SEC Chairman Harvey Pitt's proposal to replace it with the new accounting oversight body discussed previously. The POB had been in existence since 1977.

The question arises then, as to why the large public accounting firms continue to assume an immutable posture against a reorganization of the ASB, especially given the call for change by numerous influential parties and groups. The answer might lie in an observation offered by Kinney, who has served on ASB task forces and as an ASB member. As Kinney (1986, pp. 76–7) indicates, there are several ways in which audit firms in general may benefit from an SAS, including a perception of increased quality of the audit, decreased training costs (given that the SASs are taught in colleges and universities), reduced legal liability and avoidance of government intervention in the regulation of auditing. However, Kinney (p. 77) goes on to indicate that different audit firms have different agendas in the adoption of certain SASs due to their audit approach, and that the auditing standards environment (i.e., ASB activities, AICPA task forces and subcommittees) 'provides a direct link between standard setting behavior and economic self interest' (p. 77). While Kinney (1986) did not question the propriety of agency voting or lobbying by ASB members, McEnroe (1994, p. 121) raised the issue by stating:

'Because altruism may be superseded by a motivation to inject a firm's audit approach into a particular SAS, a propensity for a particular ASB member to vote for his particular firm's interest or agenda might be considered at best a dubious regard for optimal audit standard setting.'

Besides McEnroe's (1994) observation of agency voting by ASB members, Arens (1993, p. 45) observed that it is especially common for ASB members from large firms to check back with their firms on issues, especially where there may be a firm practice or philosophy in place, and it was not uncommon to see members change their vote from one meeting to the next after discussions with their national offices. However, this observation was not shared in an interview involving five ASB members (including Arens) conducted in March 1994 (Carmichael and Craig, 1994), which occurred shortly after the release of the McEnroe (1994) paper. Included in a broad range of questions was the following: (p. 45)

> It is [*sic*] been observed by some that at times, Board members seem to vote their firm's point of view rather than their own. Are these members representing themselves or their firms?
>
> ASB member George A. Lewis' reply: I have only noticed one or two times when I thought a particular board member was voting his or her firm's point of view rather than what he or she thought was right for the profession. There seems to be an honest effort on the part of every Board member to vote what is good for the profession. When I vote, I am trying to represent the interest of the local firm—the local practitioner. My firm doesn't know how I vote, nor do they really seem to care.

The other four members did not offer their opinions on the matter. Although two Big Six ASB members were present, neither defended the practice of agency lobbying and/or voting and their silence might be interpreted as tacit agreement with Lewis's remark. Additionally, it is important to note that Lewis's tenure went beyond the usual three-year term on the board. He was serving in his fifth year when he provided that observation, and he voted on eleven of the PEGSASs assessed in this paper.

In summary, since the EGSASs were issued, there have been several calls for a restructuring of the ASB, published research that directed attention to agency voting by ASB members on the EGSASs, and a statement by an ASB member that such voting behaviour was rare. With this amount of attention directed to the auditing standard-setting process since the release of the EGSASs, a research question emerges as to whether ASB members might be motivated to reduce the amount of agency voting behaviour, or perhaps to be more discrete in their lobbying efforts. They could be more discrete in their lobbying behaviour by not listing their reason for their assent with qualification or dissent vote that is similar to their firm's position as detailed in its comment letter sent to the ASB. Although there was evidence of agency voting on the EGSASs, the investigations of Moss (U.S. House, 1976) and Metcalf (U.S. Senate, 1977) preceded their release by a decade, and as a result the ASB members might have felt less vulnerable to criticisms involving such voting behaviour. If the ASB members are found to be independent-minded rule-makers in the period subsequent to the issuance of the EGSASs, it might attenuate the criticisms and concerns of the individuals, committees and other organizations calling for change. If, however, certain ASB members serve as mere proxies of their firm's positions, then they might be subject to the charge that they are more interested in 'legitimizing' their firm's audit approach via the obtainment of, or specific positioning within, an SAS rather than in serving the broader public interest. Given enough evidence of such behaviour, the AICPA might be pressured to restructure the ASB in such a way that individual firms might lose a seat on the board. Accordingly the benefits described by Kinney (1986) from participating in the auditing standard-setting process would be eliminated.

## RELATED RESEARCH

The empirical studies of the ASB over the past two decades have been mixed regarding the issue of voting independence by ASB members. Some early studies by Pearson *et al.* (1979) and McEnroe and Nikolai (1983) indicated no evidence of block voting by the then Big Eight firms. Kaplan and Pany (1992) researched the comment letters in response to the ED for SAS 59, *The Auditor's Consideration of an Entity's Ability to Continue as a Going Concern.* They found the ASB rendered an accommodating modification in the final SAS when at least three of the then Big Eight firms made an objection to an issue. They did not find, however, the efficacy of the other (non-Big Eight) comments to be as apparent.

McEnroe (1993) studied the impact of the comment letters submitted to the ED of SAS 54, *Illegal Acts by Clients*, on the final SAS. In contrast to Kaplan and Pany, he found no significant difference to exist in the degree of the success of comment integration as a function of audit firm size. Furthermore, he did not find evidence that the comments of parent organizations who had an employee on the ASB possessed an advantage over other organizations, as measured by their comments being integrated into the final SAS.

More recently, in a study of the EGSASs, McEnroe (1994) described agency voting by certain ASB members on the part of their parent organizations, especially in casting assent with qualification and/or dissent votes. McEnroe found that if a parent company did not submit a letter or was in favour of a proposed SAS, there was a 95 per cent probability that the ASB member would vote in favour of the SAS, as opposed to a greatly reduced 65 per cent probability if the parent company submitted an opposition letter. Furthermore, if a parent organization manifested opposition to the ED via a comment letter, the probability that its ASB member would lodge a 'protest' vote (either assent with qualification or dissent) rose to 50 per cent. McEnroe also provided twelve examples of positions in parent organization comment letters that were very similar to the ASB member's reason for his/her objection that was recorded in the SAS when the member cast an assent with qualification or dissent vote. As a result, McEnroe (1994, p. 130) suggested that an appropriate area of future research was to ascertain if such voting behaviour would continue on subsequent SASs.

Lastly, McEnroe and Martens (1998) examined the development of SAS 69, *The Meaning of Present Fairly in Conformity with Generally Accepted Accounting Principles in the Independent Auditors Report*, using the methodology of the

McEnroe (1993) study. They did not find a significant advantage involving the success of achieving an organization's comments (proposed modifications) into the final SAS as a function of firm size or having an employee serve on the ASB. However, they found that in the case of three influential organizations who are external to the AICPA, and whose domains of control were threatened by the proposed SAS: the FASB, the Government Accounting Standards Board (GASB) and the National State Auditors Association (NSAA), their comment integration success rate was significantly higher than the other respondents.

## RESEARCH DESIGN

Comment letters of parent organizations were obtained from the AICPA library services division and were classified by the researcher into the three categories used by McEnroe (1993): 'For Adoption—As Is', 'For Adoption—Substantive Changes Recommended' and 'Against Adoption'. The category 'For Adoption—Substantive Changes Recommended' meant that the parent organization proposed specific changes that were substantive in nature as opposed to material changes.

An independent test was made to ensure that no researcher bias was present in coding the parent organization letters. An accounting graduate student independently coded all of the response letters without knowledge of the researcher's initial classifications, resulting in an agreement rate of 94.8 per cent. A Kappa coefficient was computed and yielded a value of .80. Fleiss (1981, p. 218) states that a value greater than .75 represents an excellent degree of agreement and thus indicates a lack of significant researcher bias in the coding of the parent comment letters. The few letters for which a difference existed were classified by the researcher as 'For Adoption—As Is' versus 'For Adoption—Substantive Changes Recommended' by the graduate student. The differences arose because the changes were regarded as editorial by the researcher. After consulting with the graduate student, both individuals agreed that these letters should remain classified as 'For Adoption—As Is'.

Three separate analyses of voting behaviour were performed. The first involved a comparison of the voting behaviour by ASB members whose firms sent a comment letter to the ASB. This exercise, in part, is similar to the McEnroe (1994) study, and measures the extent to which ASB members vote in accordance with their firm's position. The next analysis involved a study of the voting behaviour of ASB members involved in the establishment of their firms' audit policy versus those who were not identified as such. This identification was made through the profiles of the ASB members included in the newsletter of the ASB, *In Our Opinion*. In the few instances where no title or responsibility was listed, the individual or his/her firm was contacted for a determination. According to a former AICPA employee involved in the auditing standard-setting process, the ASB members involved in the development of their firm's audit policy are those largely responsible for drafting their firm's comment letter on a proposed SAS. This aspect of the research extends the McEnroe (1994) work and is motivated by the belief that if an ASB member is involved in the development of an audit firm's policy, then the member would most likely also be involved in the development of the parent organization's position letter. As such, the firm's position would likely correspond with that of the ASB member, and thus the member is probably more motivated to lobby for and/or vote for the position of the parent organization, as articulated in the comment letter.[8] In the case of those ASB members not involved in audit policy, they would be expected to have less of a 'vested interest' in their parent organization's position and be expected to vote on a more independent basis. This aspect of the analysis then also tests for agency voting; however, it examines it as a function of the ASB member's role within the relevant audit firm.

The third analysis included the same classification of the ASB members, but excluded those SASs that were designed to respond to an editorial type event, such as changes in other related literature. Therefore, one would not expect as much controversy involving these auditing standards. The SASs excluded by these criterion were 66, 68, 69, 71, 74 and 78, and were identified as such by a former AICPA employee involved in the auditing standard-setting process. As in the previous analysis, this exercise tests for agency voting, but both as a function of the ASB member's position in the firm and also by SAS's that might more readily influence some aspect of the parent organization's audit approach. Accordingly, these three analyses directly address the research question as to whether there is evidence of agency voting similar to McEnroe's (1994) study.

## RESULTS

Table 2 depicts various statistics involving comment letter participation by the audit firms who have an employee serving on the ASB, as well as voting behaviour by ASB members whose firms provided a comment letter. The first analysis involved the voting behaviour of the ASB members across the entire set of the PEGSASs. For these SASs, there were 111 parent organization letters that were basically in favour of passage of the proposed standard. Many of these letters, however, recommended substantial modifications to the ED. One hundred and five of the votes cast in these cases was 'pure' assents, for a rate of 94.5 per cent. This is very similar to the voting behaviour exercised in the EGSASs where the similar vote pattern equalled 87/99 or 87.8 per cent (McEnroe, 1994, p. 134). Furthermore, the ASB members recorded either qualified assent or dissent votes in all of the three cases in which the parent organization was against the SAS. While six assent with qualification or dissent votes were cast out of these 111 cases, five of these are cited in the Appendix as examples of ASB members' protests correlating with their firm's position in the comment letter and involved cases where their firm's letter represented a 'For Adoption—Substantive Changes Recommended'. Thus, these votes also provide evidence of agency voting.

The Appendix is similar to the exhibit presented in McEnroe (1994, pp. 135–40) and identifies: (a) the title of each SAS, (b) the parent organization letters

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[8] The ASB member's position within the firm does not attenuate the argument offered by McEnroe (1994, p. 121) against the propriety of such lobbying, only the individual's motivation for doing so.

## Table 2

## POST-EXPECTATION GAP SASS 62–87

| SAS number | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total ASB member votes | 21 | 21 | 17 | 18 | 17 | 17 | 17 | 17 | 17 | 17 | 15 | 15 | 14 | 14 | 15 | 14 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 416 |
| Total parent organization letters | 8 | 5 | 3 | 4 | 2 | 6 | 2 | 4 | 5 | 2 | 1 | 5 | 4 | 5 | 3 | 5 | 2 | 7 | 2 | 5 | 6 | 7 | 6 | 7 | 3 | 5 | 114 |
| Big Eight letter[a] participation | 5/8 | 3/8 | 3/6 | 4/6 | 2/6 | 4/6 | 2/6 | 4/6 | 5/6 | 2/6 | 1/6 | 5/6 | 3/6 | 3/6 | 3/6 | 5/6 | 2/6 | 6/6 | 2/6 | 5/6 | 6/6 | 6/6 | 6/6 | 6/6 | 3/6 | 5/6 | 101/160 |
| Other public accounting letter participation | 3/11 | 2/11 | 0/9 | 0/10 | 0/9 | 2/9 | 0/9 | 0/9 | 0/9 | 0/9 | 0/7 | 0/7 | 0/7 | 2/6 | 0/7 | 0/6 | 0/7 | 1/7 | 0/7 | 0/7 | 0/7 | 1/7 | 0/7 | 1/7 | 0/7 | 0/7 | 12/205 |
| For (F) | 8 | 5 | 3 | 4 | 2 | 6 | 2 | 4 | 5 | 2 | 1 | 5 | 4 | 3 | 3 | 5 | 2 | 6 | 2 | 5 | 6 | 7 | 6 | 7 | 3 | 5 | 111 |
| Against (AG) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| ASB member assent/ parent for (A/F) | 8/8 | 4/5 | 3/3 | 3/4 | 2/2 | 5/6 | 2/2 | 4/4 | 5/5 | 2/2 | 1/1 | 3/5 | 4/4 | 3/3 | 3/3 | 5/5 | 2/2 | 6/6 | 2/2 | 5/5 | 6/6 | 7/7 | 6/6 | 7/7 | 3/3 | 4/5 | 105/111 |
| ASB member assent/ qualify or dissent/ parent for (AQ:D/F) | 0/8 | 1/5 | 0/3 | 1/4 | 0/2 | 1/6 | 0/2 | 0/4 | 0/5 | 0/2 | 0/1 | 2/5 | 0/4 | 0/3 | 0/3 | 0/5 | 0/2 | 0/6 | 0/2 | 0/5 | 0/6 | 0/7 | 0/6 | 0/7 | 0/3 | 1/5 | 6/111 |
| ASB member assent qualify or dissent/ parent against (AQ:D/AG) | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 2/2 | 0/0 | 0/0 | 0/0 | 1/1 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 3/3 |

[a] After SAS 63, the Big Eight became the Big Six.

F = Parent organization letter for SAS
AG = Parent organization letter against SAS
A = Assent
AQ = Assent qualify
D = Dissent

that were classified as against the ED, (c) ASB members who cast either an assent with qualification or a dissent vote, and (d) excerpts from parent organization comment letters that were highly correlated in substance and/or wording with their ASB member's objection (i.e., his/her reason for the assent with qualification or dissent as recorded in the final SAS).[9]

There are nine quotations listed in the Appendix, with six from national firms and three from regional audit firms (two national firms had two occurrences). Given that only twenty-three assent with qualification or dissent votes were cast for these SASs, these nine examples represent about 39 per cent (9/23) of the 'protest' votes indicated on the set of final SASs. If the thirteen assent with qualification or dissent votes for which no parent letter is on file are excluded from the analysis, the per cent of recorded protests correlating with the parent's comment letter is 9/10 or 90 per cent. As McEnroe (1994, p. 146) indicated, however, many of the parent organizations' letters are several pages in length, and therefore one might argue that the ASB member's objection recorded in the SAS might not capture the entire thrust of the letter. While this is true, it should also be noted that some of the parent's concerns may also have been resolved in the deliberations prior to the issuance of the SAS and thus, the need to record an objection due to arguments presented in those parts of the letter may have been eliminated. However, even if they weren't resolved, it would be impractical for an ASB member to record an objection in the SAS that was several pages in length and thus the written protest might be what the board member (and the relevant parent organization) considers to be the most critical flaw of the SAS.

The second analysis undertaken concerns the voting behaviour by the ASB member's function within the firm. Specifically, individuals who were involved in the establishment of their firm's audit policy might be more motivated to vote for their firm's position than those who are not associated with its development. However, at this point it should be noted that correlations between the ASB members that form audit policy for their firms and their final votes are, by necessity, spurious, since it is a comparison of votes to parent organization letters that they probably helped write.

A review of Table 3 indicates similar voting behaviour between the two types of individuals. For instance, in each of the eighteen cases where the parent organization was in favour of the proposed SAS (For Adoption—As Is), the ASB representative voted for its passage. Another measure of agency voting is the For Adoption—Substantive Changes Recommended firm positions. The individuals involved in their firm's audit policy cast assent with qualification votes in 4 of the 53 cases, a rate of 7.5 per cent, while their counterparts cast 3 out of 40 such votes, at an identical 7.5 per cent rate. Due to small expected cell sizes (less than five) a test based on a comparison of likelihoods was employed to test for a difference in votes cast by the audit policy versus non audit policy individuals (Winkler and

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[9] Although the ASB members and their firms are not identified by name, interested parties can refer to the actual SASs if they desire this information.

TABLE 3

SASS 62–87

| Firm letter | Vote cast | ASB member's position<br>Involved in establishment of audit policy | Not involved in audit policy | Total |
|---|---|---|---|---|
| For adoption—substantive changes recommended | Assent | 49 | 37 | 86 |
| For adoption—substantive changes recommended | Assent with qualification | 4 | 3 | 7 |
| For adoption—as is | Assent | 12 | 6 | 18 |
| Against | Assent with qualification | 2 | 0 | 2 |
| Against | Dissent | 1 | 0 | 1 |
| Total | | 68 | 46 | 114 |

Log likelihood ratio = 3.74854 4 df
Nonsignificant at $p > .25$

Hayes, 1975, p. 831), which is not subject to the expected value of at least five per cell as in the case of the chi square test. The statistic is calculated by doubling the difference in the natural logarithms of two likelihoods. The first is the likelihood that the probability of the type of vote depends on the individual's position in the accounting firm, while the second is that it is not dependent on the individual's position. The statistic follows a chi square distribution with 4 degrees of freedom. The $p$-value of the score of 3.74854 is non-significant at a $p$-level of between $.25 < p < .50$.

Table 4 depicts the same test for the votes cast for the more substantive (as opposed to editorial) SASs. The results are similar to these contained in Table 3 with a likelihood ratio score of 4.38193 and 4 degrees of freedom, non-significant at $p$-level of $.25 < p < .50$. Thus the results presented in Tables 3 and 4 indicate that agency voting is not restricted to individuals responsible for establishing auditing policy. Furthermore, additional evidence about this aspect is the fact that in the nine comments that are listed in the Appendix that correlate with their parent firm's letter, five individuals are associated with the establishment of their firm's audit policy, while the remaining four are not.

At this point, a limitation of this study should be mentioned. This research has compared parent organization comment letters to the EDs and compares them with the votes cast by ASB members without examining any changes to the final SAS that were intended to accommodate the proposed modification of the parent organization. If the ED were modified in this manner, one would expect a more favourable vote on the final SAS. Since this research did not examine any changes in the final SAS as a part of the analysis, this is a limitation of the study.

TABLE 4

NON EDITORIAL SASS

| | | ASB member | | |
|---|---|---|---|---|
| Firm letter | Vote cast | Involved in establishment of audit policy | Not involved in audit policy | Total |
| For adoption—substantive changes recommended | Assent | 42 | 31 | 73 |
| For adoption—substantive changes recommended | Assent with qualification | 4 | 3 | 7 |
| For adoption—as is | Assent | 11 | 4 | 15 |
| Against | Assent with qualification | 2 | 0 | 2 |
| Against | Dissent | 1 | 0 | 1 |
| Total | | 60 | 38 | 98 |

Log likelihood ratio = 4.38193 4 df
Nonsignificant at $p > .25$

## SUMMARY AND CONCLUSIONS

The primary purpose of the research was to determine if 'agency' voting behaviour described in McEnroe (1994) still exists. The results, as measured by the votes by ASB members in which a parent company letter is on file for the ED, affirm that it does. For example, the percentage of cases in which the ASB member cast an assent vote when the parent was in favour of the ED was very high in the case of both the EGSASs and the PEGSASs.

Perhaps the most telling signs of agency voting behaviour are the nine cases in which the ASB member presented a reason for his/her assent with qualification or dissent vote that was very similar to an objection in his/her parent organization letter. Since there were only ten parent company letters on file related to these nine votes, the frequency of 90 per cent provides compelling evidence.

This type of voting behaviour might be explained in two ways. The first is that the parent organization instructs or otherwise pressures its ASB member to vote in accordance with the position of the firm. A second explanation is that the ASB member is motivated to vote and otherwise lobby for the firm's position due to a shared belief system. In regard to the latter case, Farmer *et al.* (1987, p. 3) describe the internalization phase of acculturation as the point when an individual accepts the reference group's (the firm's) goals/values as his/her own. They state that audit partners and managers will more likely have reached this 'group think' stage than other staff. ASB members from audit firms are partners of their firms.

Along a similar vein, Ponemon (1992, p. 254) found that partners and managers tend to be at a stage of ethical reasoning where they are primarily motivated by the need to affiliate with peers or a reference group (i.e., the client, office colleagues or the firm) when evaluating and attempting to resolve an ethical conflict. When the firm represents this group, the individual will adhere to the rules of the profession as long as these rules are consistent with the firm's. If they are not, the firm's norms will override those of the profession.

These two studies then indicate that an ASB member might be motivated to vote or otherwise lobby for the firm's audit approach due to a 'bonding' with the firm. The Ponemon (1992) framework might explain this behaviour even when the firm's audit approach is not congruent with the audit approach that is deemed optimal by the other ASB members and the one that might not necessarily be the best for the auditing profession and society in general.

McEnroe (1994) suggested, as an area of future research, to ascertain if agency voting would continue in the promulgation of future SASs. Since this research found it still exists, the mission, objective and structure of the ASB may need to be reviewed by the AICPA and the SEC in order to determine if agency voting is deemed acceptable behaviour on the part of ASB members. Conversely, it should be determined if an independent voting process is desired, even if the Board member is responsible in whole or part of the establishment of his/her firm's audit policy. As stated earlier, it cannot be assumed that the integration of the audit policies or procedures of the ASB member's parent organization into an auditing standard are necessarily in the best interest of the auditing profession or society in general. If true, non-lobbying voting behaviour on the part of the ASB members is, in fact preferred, a full-time, independent board along the lines of the FASB might be deemed appropriate.

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# APPENDIX

## Narrative Correlations Between Parent's Position and ASB Member's Vote[1]

### *SAS 62: Special Reports*

Letters classified as against: None

Assent with qualifications: Thomas P. Bintinger (Touche Ross; no letter on file), James Brown (Crowe Chizek)

Firm A* letter: 'One issue has received considerable discussion with regard to comprehensive bases of accounting that are not generally accepted accounting principles (GAAP). This proposal deleted the requirement to refer to a footnote explaining how the presentation differs from GAAP but continues the requirement to state, when a comprehensive basis of accounting is used (OCBOA), that the financial statements are not intended to be a presentation in conformity with generally accepted accounting principles.

'We would strongly object to any reduction of the "information content" of this clear message that generally accepted accounting principles are not used. Merely stating what something is, not what it isn't, is not adequate to inform users as to whether GAAP is being followed when it is not.'

ASB Member A's assent with qualification: 'he believes that the requirements in paragraph 5d (2) and footnote 25 fails to clearly inform users about the lack of conformity with generally accepted accounting principles. It is intended that the term "a comprehensive basis of accounting other than generally accepted accounting principles" satisfy the first standard of reporting, but that the term may be unclear to some users. If the financial statements are not presented in conformity with general accepted accounting principles, he would prefer a clearer and more forceful statement to that effect.'

Firm A letter (continued): '1. The last sentence in paragraph 12 appears confusing or perhaps circular. It states that the first standard of reporting should apply only when items are presented in conformity with GAAP, and that a reference to presentation in accordance with GAAP is not needed when a non-GAAP presentation occurs. Why bother with a first standard of reporting at all if you only need to refer to GAAP at all. This reference should be amended to state a reference to lack of conformity with GAAP is needed whenever such a situation exists.'

ASB Member A's assent with qualification (continued): Mr. A 'also qualifies his assent to the last sentence of paragraph because he believes the first standard of reporting applies in all cases.'

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[1] * = regional firm. ** = national firm.

*SAS 63: Compliance Auditing Applicable to Governmental Entities and Other Recipients of Governmental Financial Assistance*

Letters classified as against: None

Assent with qualifications: Thomas P. Bintinger (Touche Ross; no letter on file), Donald L. Neebes (Ernst & Whinney; no letter on file), Robert S. Roussey (Arthur Andersen & Co.) Roussey comments not interpreted as corresponding with the major complaints of his parent organization.

*SAS 64: Omnibus Statement on Auditing Standards—1990*

Letters classified as against: None

Assent with qualifications: None

Dissent: Carl P. Gross (Altschuler, Melvoin & Glasser; no letter on file)

*SAS 65: The Auditor's Consideration of the Internal Audit Function in the Audit of Financial Statements*

Letters classified as against: None

Assent with qualification: Carl P. Gross (Altschuler, Melvoin & Glasser; no letter on file), Howard B. Levy (Laventhal & Horwath; no letter on file), Harold L. Monk, Jr. (Davis, Monk, Farnsworth & Company; no letter on file), Robert S. Roussey (Arthur Andersen & Co.)

Firm B** letter: 'We do not support the concept in the exposure draft that the work of internal auditors can directly and separately impact *both* control risk and the extent of substantive procedures the independent auditor performs . . . The exposure draft . . . creates several problems: An implication that the independent auditor is using the procedures performed by the internal auditors as a *substitute* for his or her own work—in effect subcontracting some of the external auditor's procedures to the internal auditors. *Direct Assistance* . . . we recommend this paragraph be deleted. Any qualified employee can provide direct assistance to the auditor . . . Those tasks are not unique to the internal auditor.'

ASB Member B's assent with qualification: Mr B 'qualifies his assent because he does support the concept in this Statement that work performed by internal auditors can directly and separately affect both control risk assessment and the extent of substantive procedures the auditor performs. He is concerned that the Statement may be interpreted to mean that the auditor may consider work performed by internal auditors as a replacement for the substantive procedures the auditor should perform to obtain sufficient, competent, evidential matter to support the audit opinion. Mr B. also believes that the section on Using Internal Auditors to Provide Direct Assistance to the Auditor is not necessary because other qualified client employees can provide direct assistance to the auditor. Direct assistance is not a task unique to internal auditors.'

*SAS 66: Communication of Matters About Interim Financial Information Filed or to be Filed with Specified Regulatory Agencies—An Amendment to SAS No. 36, Review of Interim Financial Information.*

Letters classified as against: None

Assent with qualification: None

Dissent: None

*SAS 67: The Confirmation Process*

Letters classified as against: None

Assent with qualification: Stuart H. Harden (Silver, Harden and Company), Don M. Pallais (Own Account; no letter on file)

Firm C* letter: 'We also believe that auditors will view the requirement . . . as placing a greater emphasis on the confirmation of accounts receivable than currently exist in paragraph 1 of Section 331 of SAS No. 1.'

ASB Member C's assent with qualification: Mr C 'believes that paragraph 35 is unnecessary and inappropriately places greater emphasis on the confirmation of accounts receivable than previously existing auditing standards.'

Firm C* letter continued: 'We believe that paragraph . . . will lead auditors to rely on a confirmation of accounts receivable even for assertions where an application of the guidance on paragraphs 1 through 31 might otherwise lead the auditor to a more effective test. We believe that this may prove particularly troublesome in that not all assertions are adequately addressed by confirmation, as the proposed SAS discussed in paragraphs 10 through 13, and that auditors may place an unwarranted degree of reliance on the confirmation process in the audit of accounts receivable simply because of the importance placed on the procedure.'

ASB member's assent with qualification continued: 'Paragraph 12 notes that confirmations do not address all assertions equally well. Messrs C and X believe that paragraphs 34 and 35 may lead auditors to place undue reliance on confirmation of accounts receivable for assertions where application of the guidance in paragraphs 1 through 33 might otherwise lead the auditor to select a more effective test.'

*SAS 68: Compliance Auditing Applicable to Governmental Entities and Other Recipients of Government Financial Assistance.*

Letters classified as against: None

Assent with qualification: None

Dissent: None

*SAS 69: The Meaning of Present Fairly in Conformity with Generally Accepted Accounting Principles in the Independent Auditors Report.*

Letters classified as against: None

Assent with qualification: None

Dissent: None

*SAS 70: Reports on the Processing of Transaction by Service Organizations.*

Letters classified as against: None

Assent with qualification: None

Dissent: None

*SAS 71: Interim Financial Information.*

Letters classified as against: None

Assent with qualification: None

Dissent: None

*SAS 72: Letters For Underwriters and Certain Other Requesting Parties*

Letters classified as against: None

Assent with qualification: None

Dissent: None

*SAS 73: Using the Work of a Specialist*

Letters classified as against: None

Assent with qualification: J. E. Katzenmeyer (Ernst & Young), Edmund R. Noonan (KPMG Peat Marwick)

Firm D** letter: 'In practice, the exclusion from the applicability of the proposed standard described in footnote 3 to paragraph 1 (i.e., when the specialist is employed by the auditor's firm and participates in the audit) may be difficult to distinguish from the situation described in paragraph 1(b) in which management engages a specialist employed by the auditor's firm to provide advisory services and the auditor intends to use that specialist's work as evidential matter. We suggest the Board consider defining what is meant by the term "participates in the audit" (to distinguish it from using a firm-employed specialist's work as audit evidence).'

ASB Member D's assent with qualification: Although Mr D 'agrees with the overall thrust of the guidance in paragraph 9 and footnote 5 to item e, he believes the auditor's understanding of the nature of the specialist's work in all cases should include a requirement that the specialist understand that his or her findings may be used to corroborate assertions in the financial statements. This may be accomplished in a number of ways, including, but not limited to, contacting the specialist.'

Firm E** letter: 'Because these paragraphs only provide limited guidance to auditors for determining when to use the work of a specialist, we believe they may increase the likelihood that auditors will be sued successfully when they have not used specialists, especially in connection with the valuation of clients' real estate and special purpose inventories. We believe the guidance in these paragraphs should be expanded before the final SAS is issued to describe the types of factors auditors should consider when deciding whether to use a specialist. The decision to use a specialist is affected by such factors as the auditors' experience and expertise in the particular area, the risk of material error in the accounts affected, the significance of the audit area to the financial statements, the client's control environment and control (and other) procedures in the area, and the nature, timing, and extent of the auditors' other procedures performed in the particular area and related areas.'

ASB member E's assent with qualification: Mr E 'qualifies his assent because he believes that this Statement fails in paragraphs 6 and 7 to provide sufficient guidance for determining when to use the work of a specialist, especially in connection with the valuation of a client's real estate and "special-purpose" inventory. In addition to the factors described in paragraph 6, Mr E believes the decision to use the work of a specialist for an assertion(s) is influenced by such factors as the auditor's experience and expertise in the particular field, the risk of material misstatement, the significance of the assertion(s) to the financial statements, the client's control environment and control (and other) procedures, and the nature and extent of other procedures performed by the auditor.'

*SAS 74: Compliance Auditing Considerations In Audits of Governmental Entities and Recipients of Governmental Financial Assistance*

Letters classified as against: None

Assent with qualification: James E. Brown (Baird, Kurtz and Dobson; no letter on file)

Dissent: None

*SAS 75: Engagements to Apply Agreed Upon Procedures to Specified Elements, Accounts, or Items of Financial Statement*

Letters classified as against: Coopers & Lybrand, Larson, Allen & Weishar & Co.

Assent with qualification: James S. Gerson (Coopers & Lybrand), Charles J. McElroy (Larson, Allen, Weishar & Co.), W. Ronald Walton (Price Waterhouse; no letter on file)

Dissent: None

Firm F* letter: 'We feel that the effect of having two similar standards in different parts of the authoritative literature will be to cause confusion in practice. The rationale for having two standards is that under the audit standard management's assertion is embodied in the financial statements whereas in cases covered by the attestation standard management makes a separate written assertion. We feel the distinction will become blurred in practice and could be erased by requiring a written assertion for all agreed upon procedures engagements ... We feel that the guidance for agreed-upon procedures could be accomplished with one standard. We do not find the rationale for having two standards compelling enough to justify two standards when a general problem of standards overload exists.'

ASB Member F's assent with qualification: 'he believes that essentially the same guidance is contained in Statement on Standards for Attestation Engagements (SSAE) No. 4 *Agreed-Upon Procedures Engagements*, which is being issued concurrently with this Statement. He believes that the guidance for agreed-upon procedures engagements would have been better accomplished by issuance of a single Standard. This Statement encompasses engagements to apply agreed-upon procedures to specified elements, accounts, or items of a financial statements and permits management's assertion to be either written or implied. SSAE No. 4 encompasses other agreed-upon procedures engagements and requires that management's assertion be in writing. Mr. F believes this distinction to be impractical unnecessary confusing to both practitioners and users, and not of sufficient importance to justify two separate standards. Instead he believes that a written assertion by management should be required for all engagements encompassed by either Standard. He believes such a requirement would not be onerous and would remove an unnecessary difference between the two Standards.'

Firm G** letter: 'We do not believe that there is a solid conceptual or practical basis for the restriction with respect to internal auditors contained in paragraph 21 of the proposed SSAE, which requires that the agreed-upon procedures be performed entirely by the practitioner. We believe that it is appropriate for internal audit to be able to provide direct assistance to the practitioner, as long as the report describes the involvement of the internal audit in a manner sufficient for the users to understand such involvement. The guidance in AU 322.37 with respect to the auditor's assessment of the internal auditor's competence and objectivity, and the supervision, review, evaluation, and testing of the work performed by internal auditors, would be appropriate in such circumstances.'

(Although this was a letter referring to the ED of Standards for Attestation Engagements No. 4—*Agreed Upon Procedures Engagements*—many of the provisions of SAS 75 and this document were identical and the firm's

ASB member had made the same complaint to SSAE 4, thus the firm wrote one letter without redundant complaints.)

Firm G** letter continued: 'The AICPA Auditing Standards Board has issued, concurrent with the proposed SSAE, a proposed Statement on Auditing (SAS), *Engagements to Apply Agreed Upon Procedures to Specified Elements, Accounts, or Items of Financial Statement.* The two documents are very similar in many of their own provisions, and in many cases are identical. One of the principal differences is the subject matter to which they relate. The proposed SAS addresses accounting information, and the proposed SSAE addresses information other than accounting information.

'We believe that issuing two documents that are very similar, under two different portions of the professional literature, will be very confusing to practitioners. In fact, in many agreed-upon procedures engagements, information of both accounting and non-accounting nature are addressed. We suggest that a better solution would be to have one document address agreed-upon procedures, regardless of the nature of the information to which the procedures are applied.'

ASB member G's assent with qualification (as well as ASB member Y): 'they do not believe that there is a solid conceptual or practical basis for the restriction with respect to internal auditors contained in paragraph 24, which requires that the agreed-upon procedures be performed entirely by the accountant. They believe that it is appropriate for internal audit to provide direct assistance to the accountant, as long as the report describes that involvement of internal audit in a manner sufficient for the users to understand such involvement. The guidance in paragraph 27 of SAS No. 65, *The Auditor's Consideration of the Internal Audit Function in an Auditor Financial Statements* (AU sec. 322) with respect to an assessment of the internal auditor's competence and objectivity, and the supervision, review, evaluation, and testing of the work performed by internal auditors, would be appropriate in such circumstances.'

*SAS 76: Amendments to Statement on Auditing Standards No. 72. Letters for Underwriters and Certain Other Requesting Parties*

Letters classified as against: None

Assent with qualification: None

Dissent: None

*SAS 77: Omnibus Statement on Auditing Standards—1995*

Letters classified as against: None

Assent with qualification: None

Dissent: None

*SAS 78: Consideration of Internal Control in a Financial Statement Audit: An Amendment to SAS No. 55.*

Letters classified as against: None

Assent with qualification: None

Dissent: None

*SAS 79: Amendment to Statement on Auditing Standards No. 58, Reports on Audited Financial Statements*

Letters classified as against: Ernst & Young

Assent with qualification: None

Dissent: John J. Kilkeary (Ernst & Young)

Firm E** Letter: '1. Uncertainty paragraphs are helpful to financial statement users by highlighting those significant uncertainties that are either reasonably possible or probable of resulting in a material loss. These paragraphs heighten user's awareness of such matters, and therefore, are valuable to them. Appropriately, the uncertainty paragraph relating to going concern is being retained. While the going concern paragraph serves two purposes, i.e., communicating the basis for the accounting principles used as well as highlighting the existence of an uncertainty, financial statement users focus on the latter purpose. Because the mandatory uncertainties paragraph also serves the latter purpose, we believe its elimination would be both unwise and inconsistent with the retention of the going concern paragraph. We believe that an optional emphasis paragraph is not a good alternative. 2. No persuasive evidence has been presented to demonstrate that:

a. Financial statement users would benefit from the change.
b. Use of the mandatory uncertainties paragraph is currently being abused. To the contrary, a recent review of public companies' files revealed that less two percent of the 11,000 registrants had such paragraphs relating to uncertainties other than going concern, while ten percent of registrants had going concern paragraphs.
c. Statement of Position (SOP) 94-6, *Disclosure of Certain Significant Risks and Uncertainties*, will cause the use of such paragraphs to increase. Moreover, even if this happens, we are not persuaded that this would be undesirable since such paragraphs are useful to financial statement users.

3. The exposure draft argues that the explanatory paragraph's only value is to provide additional information with the increased disclosure requirements in SOP 94-6, this information is superfluous and redundant. The ASB rejected this line of reasoning when it decided to retain consistency paragraphs in auditors' reports when SAS 58 was issued. This reasoning is equally invalid with respect to eliminating explanatory paragraphs for material uncertainties.

the marginal utility of money is the same to both parties,[3] then total social welfare has been enhanced. The basis for this position is that the promisor can choose whether or not to perform the contract, provided the plaintiff receives expectation damages equal to the value of the loss incurred as a result of the contracted goods or services not being provided. The promisor will break the contract if the (expected) gains from breach are greater than the (expected) damages to be paid. Of course, the gains from breaching the contract may go beyond the immediately observable gains, due to flow-on effects into other lines of business and/or an enhanced future stream of profits as a result of the alternative use to which the promisor put the goods or services. These additional gains may not be immediately obvious to the external onlooker, and may be difficult to quantify objectively in any event.

The notion of efficient breach says the measure of social welfare is the maximization of efficiency through the optimal use of resources, as evidenced by the accumulation of monetary returns, which the law should facilitate. However, the process of disgorgement, which allows for the seizure of private gains made by breaching a contract, runs counter to this goal by going far beyond mere compensation, and thus runs counter to the commercial basis of the law, the protection it is designed to offer and the incentives it should provide for social-wealth-creating conduct.

By its very nature, the term ‘efficient breach’ suggests that a breach leads to a more efficient use of resources. The cornerstone of the theory is that people should be permitted to breach a contract and pay compensation if they perceive a more profitable activity than the one into which they are currently contracted, despite the earlier mutual acceptance of the terms of the contract. Efficient breach theory is a catalyst for a view of the law, as enunciated by Posner (1998), which suggests that legal rules should be selected to maximize economic efficiency in the sense of achieving the optimum allocation of resources. The ‘efficient breach’ argument, as we shall shortly discuss, suggests that the allowance of disgorgement for the breach of a contract reduces valuable economic activity. Proponents of the efficient breach theory suggest that if the promisor’s profits from the breach exceed the loss to the promisee, the breach should be permitted, or even encouraged, on the ground that it leads to the optimum use of society’s scarce resources and the maximization of social welfare. The theory is based on the assumption that the promisor will opt to breach the contract if the expected gains from the breach exceed the amount expected to be paid as damages to the promisee. The promisee is compensated for his or her avoidable loss and no more.

While the efficient breach rule is designed to reduce transaction costs arising from breach of contract claims, its application may neither minimize the number of transactions arising from a breach, nor will it necessarily reduce the total transaction costs involved. An efficient breach will involve at least two transactions within the classification 'damages'. However, the courts have consistently emphasized that the awards are based on compensatory principles rather than restitutionary principles. The English Law Commission in its report on *Aggravated, Exemplary and Restitutionary Damages* (1977, para 3.37) concludes that in addition to the tradition of not awarding exemplary damages in contract, there is a tradition of not awarding restitution for breach of contract, with the probable exception of a restrictive covenant.

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[3] This means that a dollar gained by the promisor is valued at exactly the same amount as the dollar lost by the promisee. This is not necessarily always true, especially if the promisor is considerably wealthier than the promisee.

## COMPETING POLICY OBJECTIVES

Jones (1983, p. 452) discusses precedents in favour of the conclusion that the law is now sufficiently mature to recognize a restitutionary claim for profits made from a breach of contract. He also discusses the counter-argument that any claim to recover the defendant's profits from a breach of contract is unwise. Chen-Wishart (1998, p. 369) summarizes the central incompatibility of the two competing policy objectives under the heading 'Enhancing Contract Rights v Efficient Breach'. The first objective is to protect the plaintiff's contract right by removing the defendant's incentive for breach. The second takes as its essential premise the belief that a breach should not be condemned if it increases total social welfare, regardless of its impact on the entity whose contractual rights are damaged.

The starting point for any discussion of the theory of efficient breach is the observation of distinguished jurist Oliver Wendell Holmes (1897, p. 457):

> If, when a man promised to labour for another, the law made him do it, his relation to his promisee might be called a servitude *ad hoc* with some truth. But that is what the law never does. It never interferes until a promise has been broken, and therefore cannot possibly be performed according to its tenor. It is true that in some instances equity does what is called compelling specific performance . . . This remedy is an exceptional one. The only universal consequence of a legally binding promise is, that the law makes the promisor pay damages if the promised event does not come to pass. In every case it leaves him free from interference until the time for fulfillment has gone by, and therefore free to break his contract if he chooses.

Holmes is regarded as an advocate of economic analysis and the theory of 'efficient breach', which is one of the main arguments to support the position that disgorgement or restitutionary damages should not be allowed for breach of contract. However Smith (1994–5, p. 133, n. 50) discusses those who draw support from Holmes and cites Holmes: 'The duty to keep a contract at common law means a prediction that you must pay damages if you do not keep it—and nothing else: The Path of Law (1897), 10 Har. L.R. 457 at p. 463.' Smith considers that 'It does not entail that he [Holmes] viewed efficiency as the primary desideratum of the law'. Rather it reflects: '(i) Holmes was a legal realist; and (ii) he did not think that disgorgement was available for breach of contract'.

Proponents of efficient breach theory advocate permitting breach of contract if the promisor's profits from the breach exceed the loss to the promisee. The economic justification for this proposition is that if the monetary gains to the entity committing the breach exceed the monetary losses to the promisee, and assuming

2 IR 230, 240): 'You are not to enrich the party aggrieved: you are not to impoverish him; you are so far as money can, to leave him in the same position as before.'

The object of normal compensatory damages is to compensate the plaintiff for the damage, loss or injury suffered. The rule was first clearly stated by Parke B in *Robinson v Harman* (1848) 1 Ex 850, p. 855: 'Where a party sustains a loss by reason of a breach of contract, he is, so far as money can do it, to be placed in the same situation, with respect to damages, as if the contract had been performed'. The general rule is that an innocent party will recover the actual loss and the guilty party will not be liable to repay any amount in excess of the actual loss.

Damages which are designed to punish the guilty party are variously called exemplary damages, vindictive damages or punitive damages. Exemplary damages are awarded not to compensate but to punish, and generally are not available in contract. In *Ruxley Electronics Ltd v Forsyth* [1996] 1AC 344, p. 353 Lord Harwich said: 'damages for breach of contract must reflect, as accurately as the circumstances allow, the loss which the claimant has sustained because he did not get what he bargained for. There is no question of punishing the contract breaker.'

However, in New Zealand there is an emerging trend to award exemplary damages in contract. In the Court of Appeal, in an unreported employment case *Telecom Corporation of New Zealand Ltd v Business Associates Ltd* (23/6/1993, CA 41/93), Richardson J accepted that exemplary damages may be awarded and stated (at p. 10): 'It is both necessary and sufficient that there is something outrageous in the conduct of the defendant which deserves to be punished in an award of damages over and above what would constitute reasonable compensatory damages'. In the High Court, exemplary damages have been awarded in *Tak and Co. Inc v AEL Corp Ltd* (1995) 5 NZBLC 103,887 and in *Cash Handling Systems Ltd v Augustus Terrace Developments Ltd* (1996) 3 NZ ConvC 192,398 (see the discussion below).

Exemplary damages[2] in contract are an exception to the general rule that damages are compensation for loss. *McGregor on Damages* (1997, pp. 12–15) also outlines special cases, rather than exceptional, where the plaintiff may recover for more than the loss suffered. One of the special categories covers cases 'in which the wrong committed by the defendant has involved an interference with the plaintiff's property, whether land, goods or shares, whereby the defendant has gained the use of the property for a period of time'. Under this category are cases 'in which a plaintiff landowner has been awarded as damages the amount which the neighbouring landowner would have been prepared to pay in order to gain release from his contractual obligation of performing a restrictive covenant such as *Wrotham Park Estate Co. Ltd v Parkside Homes* [1974] 1 WLR 798, *Jaggard v Sawyer* [1995] 1 WLR 269 and *Surrey County Council v Bredero Homes* [1993] 1 WLR 1361 CA'. *McGregor on Damages* (p. 15) submits that, properly regarded, these cases, in rightly stressing the benefit to the defendant where it has exceeded the loss to the plaintiff, base themselves in restitution and on a strict view are not exceptionally, a just response to a breach of contract so requires, the court should be able to grant the discretionary remedy of requiring a defendant to account for the benefits he has received from his breach of contract.' However, Tilbury *et al.* (2000, p. 423) note that the terms ' "account of profits" and "restitutionary damages" have no constant meaning, nor are they necessarily treated as separate remedies. Indeed the need for and the point of any demarcation between these two remedies are not clear.'

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[2] See Kercher and Noone (1990).

A remedy involving an account of profits involves an account or measurement being taken to determine the profit made by the defendant, in contrast to the usual approach of measuring simply the loss suffered by the plaintiff as a result of the wrong.[1] With the account of profits remedy, the actual loss to the plaintiff is irrelevant in assessing damages.

It might normally be expected that a breach of contract would involve what economists call a zero-sum game, which occurs when the benefit to the winning entity exactly matches the loss to the losing party. But in business, this is not necessarily the case. The plaintiff's loss could be smaller than the ensuing gains to the breaching party, especially if the long run gains to the breach are taken into account, as this entity takes the opportunity to do better than it had originally anticipated under the contract, due to the changed market opportunities available to it now and in the future.

As a result of the House of Lords case *Attorney-General v Blake and Another* [2000] 3 WLR 625, the total benefit that the defendant has gained from breaking a contract is no longer an academic question. This article considers restitutionary damages in the contractual setting in Australia, New Zealand and the United Kingdom, taking into consideration the economic notion of efficient breach, and the House of Lords' response to this 'devilishly difficult topic' (per Lord Nicholls citing Burrows, 1993, pp. 453–4).

## THE GENERAL RULE

When a breach of contract is established, the general principle is that an innocent party cannot recover the profits that the party in breach has gained from the breach of contract. The principles are summarized in the dicta of Megarry V-C in *Tito v Wardell* [1977] 3 All ER 129, p. 316:

> [I]t is fundamental to all questions of damages that they are to compensate the plaintiff for his loss or injury by putting him as nearly as possible in the same position as he would have been in had he not suffered the wrong. The question is not one of making the defendant disgorge what he has saved by committing the wrong, but one of compensating the plaintiff. In the words of O'Connor LJ in *Murphy v Wexford County Council* ([1921]

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[1] Of course, in requiring an account of profit, the courts will have to face the difficult empirical issue of discovering and measuring the incremental profits directly attributable to the breach. Creative accounting procedures are likely to be involved, whereby clever accountants could significantly understate these incremental profits, and so careful forensic evaluation of claims by a court will be necessary. This is not, of course, to say that proof of the loss suffered by the plaintiff is never uncontroversial.

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MAREE C. CHETWIN AND DAVID K. ROUND

# Breach of Contract and the New Remedy of Account of Profits

This paper outlines the general loss-based damages rule when a breach of contract is established, in light of the competing policy objectives of enhancing contract rights v efficient breach. The economic premises behind the theory of efficient breach are briefly discussed. The paper then summarizes the legal background to the House of Lords decision *Attorney-General v Blake and Another* [2000] 3 WLR 625 where it was ruled that in exceptional cases the plaintiff who has suffered no loss as a result of the breach may recover the resultant profits that the defendant has gained. The court was reluctant to specify fixed rules as to when the discretion should be exercised. The article concludes that the remedy was specifically devised for *Blake's* case and will have extremely limited application.

**Key words:** Account of profits; Coase theorem; Compensatory damages; Restitutionary damages; Transaction costs.

The English Law Commission in its report on *Aggravated, Exemplary and Restitutionary Damages* (1997, para 3.44) recommended that 'The development of the law of restitution for breach of contract should be left to common law development'. Restitutionary damages as defined by the Commission (para 1.82) are assessed according to the gains made by the defendant rather than loss to the plaintiff. Earlier, in 1983, Jones (1983, p. 452) had suggested, 'A bold court could find, therefore, respectably attractive precedents for a conclusion that the law is now sufficiently mature to recognize a restitutionary claim for profits made from a breach of contract. But the critical and hard question is whether it is really desirable to recognize a new restitutionary claim based on the defendant's breach of contract'.

Fifteen years after Jones had made this observation, and despite the finding of the English Law Commission, Lord Woolf MR in the English Court of Appeal in *Attorney-General v Blake* [1998] 1 All ER 833 acknowledged that 'the time has come to accept Professor Jones' view . . . that the law is now sufficiently mature to recognize a restitutionary claim for profits made from breach of contract in appropriate circumstances'. In the ensuing appeal to the House of Lords (*Attorney-General v Blake and Another* [2000] 3 WLR 625, p. 638), Lord Nicholls preferred to avoid the unhappy expression 'restitutionary damages' and stated: 'When,

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## APPENDIX

The ROCI-II comprises twenty-eight statements which measure the five conflict management styles. Sample statements are given below. The full instrument is not reproduced for copyright reasons.

I use 'give and take' so that a compromise can be made.
I am generally firm in pursuing my side of the issue.
I usually allow concessions to . . .
I avoid an encounter with . . .
I use my authority to make a decision in my favour.
I try to find a middle course to resolve an impasse.

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management process. Other contextual variables that may affect bargaining strategy could also be explored.

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The overall mean of almost seven out of ten indicates that participants believed that the inventory valuations in the financial statements would be misstated if no writedown took place, reflecting the materiality of the issue under dispute. A significant difference occurs on the basis of client size, with participants indicating that they would be more likely to qualify the accounts of a larger client. This finding appears to be inconsistent with the results for RQ2 which suggest that auditors are likely to use less assertive conflict management styles when the client is large. It should be borne in mind, however, that the question focused on the action the auditor would take if the conflict remained completely unresolved. The results suggest that auditors may be conscious of the client's power during the negotiation process but they are also aware of the risks of audit failure if the client refuses to move from its original position. A more complete reconciliation of these results again provides an opportunity for further research.

Table 8 also indicates that partners would be more likely to qualify the accounts than would managers. This result is consistent with the earlier finding that managers appear to be more willing to accommodate the views of the client.

## CONCLUSION

This study is the first to examine the conflict management styles used by audit partners and managers when resolving financial statement issues with clients. Participants indicated that, in general, they primarily use the integrating style to resolve disputes. The compromising and dominating styles are used to a lesser extent while the obliging and avoiding styles are rarely used. Managers are more likely to use the compromising, obliging and avoiding styles than are partners. The size of the client and the strength of corporate governance mechanisms in place have a significant but relatively minor impact on the choice of styles. Consistent with the contingency perspective (Rahim, 1992, 1997), this suggests that auditors do make some adjustments to the way that they resolve conflicts depending on the nature and seriousness of the dispute. With regard to the other parties who would assist the auditor to resolve the conflict, it was found that the audit committee was perceived to give the most assistance, followed by the CEO.

The study is an exploratory one and, bearing in mind its limitations, it provides insights into the bargaining strategy used by auditors when resolving conflicts with clients. Such strategy can have an impact not only on the outcome of the particular issue under dispute but also on the way that future conflicts with the client are resolved (Gibbins *et al.*, 2001). The differences in styles used by partners and managers have implications for training in negotiation skills at senior levels of the audit firm. Further evidence is provided concerning the members of the client who are most likely to assist the auditor to resolve a conflict and reinforces the importance of the role of the audit committee in this regard.

Many opportunities for further research have been discussed in previous sections. Of particular note are the impact of the audit team on conflict management and the impact of conflict management style on the negotiation outcome. In addition, future work could attempt to capture the dynamic nature of the conflict

TABLE 8

WOULD THE AUDITOR QUALIFY THE ACCOUNTS? THE IMPACT OF CLIENT SIZE, CORPORATE GOVERNANCE AND PARTICIPANT'S RANK

| Factor | *F*-value | sig. | Descriptive statistics | |
|---|---|---|---|---|
| | | | *n* | Mean<br>(*sd*) |
| Size of client | 4.070 | .048 | | |
| Large | | | 40 | 7.350<br>(1.748) |
| Small | | | 32 | 6.406<br>(2.434) |
| Corporate governance | 0.215 | .645 | | |
| Stronger | | | 34 | 7.030<br>(2.067) |
| Weaker | | | 38 | 6.842<br>(2.188) |
| Auditor's rank | 5.477 | .022 | | |
| Partner | | | 39 | 7.410<br>(2.099) |
| Manager | | | 33 | 6.364<br>(2.028) |
| Overall | | | 72 | 6.931<br>(2.119) |

likely to assist in resolving the conflict than would an independent chairman in the strong governance condition. A marginally significant difference ($p = .052$) for the audit committee suggests that a stronger, more independent audit committee would be more likely to help resolve the conflict than would a weaker committee. There are also significant differences based on rank of respondent. Partners believe that both the audit committee and the board of directors are more likely to assist in resolving the conflict than do managers.

Further research could explore these issues in greater depth, examining why auditors regard some parties as more likely to assist in resolving disputes. This could relate to the willingness of the parties, their capability, their expertise, their power or their relationship with the auditor. These are interesting governance issues which have received little attention from researchers. Furthermore, a key limitation of the present study is its failure to capture the impact that other members of the audit firm, notably the technical partner and the managing partner, might have on the auditor–client negotiation process. Thus, further research is needed that focuses on inter-group conflict management between the audit firm and the client management team.

*The Likelihood of a Qualified Audit Report* The final question in Part Two of the instrument related to the likelihood that the auditor would issue a qualified audit report if the conflict remained unresolved and the client company maintained its original position. Results are reported in Table 8.

TABLE 7

THE PARTIES WHO WOULD ASSIST THE AUDITOR TO RESOLVE THE CONFLICT: IMPACT OF CLIENT SIZE, STRENGTH OF CORPORATE GOVERNANCE AND PARTICIPANT'S RANK[a]

**Panel A: ANOVAs**

| Factor | CEO<br>*F*-value<br>(sig.) | Board chairman<br>*F*-value<br>(sig.) | Audit committee<br>*F*-value<br>(sig.) | Board of directors<br>*F*-value<br>(sig.) |
|---|---|---|---|---|
| Size of client | 1.867<br>(.177) | 2.805<br>(.099) | 0.155<br>(.695) | 1.676<br>(.200) |
| Corporate governance | 1.570<br>(.215) | 7.314<br>(.009) | 3.932<br>(.052) | 0.338<br>(.563) |
| Auditor's rank | 0.005<br>(.946) | 2.054<br>(.157) | 5.131<br>(.027) | 5.518<br>(.022) |

**Panel B: Treatment Statistics**

| Factor | *n* | Mean<br>(*sd*) | Mean<br>(*sd*) | Mean<br>(*sd*) | Mean<br>(*sd*) |
|---|---|---|---|---|---|
| Size of client | | | | | |
| Large | 40 | 6.725<br>(2.010) | 6.300<br>(1.800) | 7.925<br>(1.655) | 6.000<br>(1.797) |
| Small | 32 | 7.438<br>(2.031) | 7.313<br>(2.442) | 8.000<br>(1.778) | 6.750<br>(2.286) |
| Corporate governance | | | | | |
| Stronger | 34 | 6.705<br>(2.140) | 6.088<br>(2.137) | 8.265<br>(1.399) | 6.206<br>(2.057) |
| Weaker | 38 | 7.342<br>(2.017) | 7.342<br>(2.017) | 7.684<br>(1.905) | 6.447<br>(2.063) |
| Auditor's rank | | | | | |
| Partner | 39 | 7.026<br>(2.412) | 7.051<br>(2.438) | 8.487<br>(1.254) | 6.923<br>(2.070) |
| Manager | 33 | 7.061<br>(1.658) | 6.394<br>(1.731) | 7.333<br>(1.948) | 5.636<br>(1.817) |
| Overall | 72 | 7.042<br>(2.086) | 6.750<br>(2.154) | 7.959<br>(1.700) | 6.333<br>(2.049) |

[a] Because none of the interaction effects were significant, only main effects are reported.

are significant at the .05 level, with only a marginally significant difference with respect to the board chairman ($p = .099$). As far as corporate governance is concerned, it should be recalled that in the weak condition, the CEO was also chairman of the board and thus the means are the same. The means for the CEO in the strong condition and the CEO/chairman in the weak condition do not differ significantly. However, auditors expect that the CEO/chairman would be more

TABLE 6

THE CONFLICT MANAGEMENT DIMENSIONS: IMPACT OF CLIENT SIZE, STRENGTH OF CORPORATE GOVERNANCE AND PARTICIPANT'S RANK[a]

**Panel A: ANOVAs**

| Factor | Integrative<br>*F*-value<br>(sig.) | Distributive<br>*F*-value<br>(sig.) |
|---|---|---|
| Size of client | 5.577<br>(.021) | 3.501<br>(.066) |
| Corporate governance | 0.793<br>(.376) | 5.562<br>(.021) |
| Auditor's rank | 5.378<br>(.024) | 2.381<br>(.128) |

**Panel B: Treatment statistics**

| Factor | *n* | Mean<br>(*sd*) | Mean<br>(*sd*) |
|---|---|---|---|
| Size of client | | | |
| Large | 40 | 2.741<br>(1.163) | 1.012<br>(1.042) |
| Small | 32 | 3.444<br>(1.309) | 1.642<br>(1.277) |
| Corporate governance | | | |
| Stronger | 34 | 2.907<br>(1.301) | 1.002<br>(1.043) |
| Weaker | 38 | 3.184<br>(1.246) | 1.551<br>(1.259) |
| Auditor's rank | | | |
| Partner | 39 | 3.407<br>(1.278) | 1.481<br>(1.176) |
| Manager | 33 | 2.635<br>(1.145) | 1.068<br>(1.177) |

[a] Because none of the interaction effects were significant, only main effects are reported.

### *Supplementary Research*

*The Members of the Client Who Would Assist to Resolve the Dispute* Table 7 reports the results of ANOVAs, together with the descriptive statistics relating to the parties who participants considered would assist to resolve the conflict. As seen in Panel B of the table, overall, the audit committee is regarded as the most likely party to be of assistance, followed by the CEO. This contrasts with the findings of Gibbins *et al.* (2001) where the CEO was more involved in negotiations than the audit committee.

Panel A of Table 7 indicates that the size of the client has little impact on the auditor's perceptions of who would help resolve the conflict. None of the differences aspects of this style when the client is small.[22] Both of these styles indicate assertiveness[23] and thus, taken together, this suggests that auditors are more willing to use assertive behaviour to manage conflicts when the client is small than when the client is large and influential. Size of client is also significant for the integrative dimension and marginally significant for the distributive dimension. Participants appear to be more likely to try and satisfy the concerns of both parties when the client is small compared to when it is large and influential. However, they are also somewhat more likely to lean towards satisfying their own concerns at the expense of the concerns of the client. Again, this suggests the use of more assertive conflict management styles when the client is small. Further research is needed, however, to establish which aspects of size are driving these results. Future studies could examine in more depth factors such as risk, complexity, cost of the audit and fear of losing the client to assess their impact on conflict management practices.

The corporate governance factor, while not significant in the overall model, is marginally significant for the obliging style, with auditors being slightly more likely to use this style when governance is strong. The distributive dimension is also significant, with auditors more likely to satisfy their own concerns when governance is weaker. These results suggest that auditors are more willing to accept the views of the finance director when they know that sound corporate governance structures are in place to monitor his decisions but are more assertive when governance is weak. While this finding is not surprising, it would be interesting to explore which aspects of corporate governance are important to the auditor.

Consistent with the results for RQ1, the rank of the auditor is significant for the compromising, obliging and avoiding styles, with managers being more likely than partners to use each of these three styles. All of these styles show a low concern for self, thus suggesting that managers are more willing to accommodate the views of the client than are partners. Partners also score significantly higher on the integrative dimension, largely due to their lower score for the avoiding style. These results may reflect a perceived power imbalance between client management and audit managers (Windsor and Ashkanasy, 1995). Alternatively, it may reflect a relative lack of experience on the part of audit managers when negotiating with client management. In either case, the findings further support the need for staff development at senior levels in the audit firm in order to ensure that managers possess appropriate negotiation skills.[24]

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[22] Some interesting directional differences occur between the means for the compromising and dominating styles for the size of client factor. Further tests revealed that these differences are not statistically significant. As this could be due to small sample sizes, further research could explore whether this is the case.

[23] This is because they both indicate a high concern for self (see Figure 1).

[24] Again, this part of the study does not attempt to identify the impact of conflict management style on the outcome of the dispute. The present study focuses on conflict management style as a dependent variable, thus laying a foundation for additional research using, for example, path analysis or structural equation modelling, to measure conflict management style as both a dependent variable and as an antecedent to the final negotiation outcome. This suggestion for further research came from an anonymous referee.

### TABLE 5

### THE CONFLICT MANAGEMENT STYLES USED: IMPACT OF CLIENT SIZE, STRENGTH OF CORPORATE GOVERNANCE AND PARTICIPANT'S RANK[a]

**Panel A: ANOVAs**

| Factor | Integrating<br>*F*-value<br>(sig.) | Compromising<br>*F*-value<br>(sig.) | Dominating<br>*F*-value<br>(sig.) | Obliging<br>*F*-value<br>(sig.) | Avoiding<br>*F*-value<br>(sig.) |
|---|---|---|---|---|---|
| Size of client | 12.174<br>(.001) | 0.403<br>(.528) | 3.389<br>(.070) | 0.325<br>(.571) | 0.586<br>(.447) |
| Corporate governance | 0.344<br>(.560) | 0.553<br>(.460) | 1.845<br>(.179) | 3.833<br>(.055) | 0.586<br>(.447) |
| Auditor's rank | 0.059<br>(.808) | 6.747<br>(.012) | 0.411<br>(.524) | 10.574<br>(.002) | 9.200<br>(.003) |

**Panel B: Treatment statistics**

| Factor | *n* | Mean<br>(*sd*) | Mean<br>(*sd*) | Mean<br>(*sd*) | Mean<br>(*sd*) | Mean<br>(*sd*) |
|---|---|---|---|---|---|---|
| Size of client | | | | | | |
| Large | 40 | 5.832<br>(0.555) | 4.556<br>(0.967) | 4.295<br>(0.748) | 3.283<br>(0.764) | 3.092<br>(0.902) |
| Small | 32 | 6.272<br>(0.551) | 4.281<br>(1.105) | 4.694<br>(1.079) | 3.052<br>(0.746) | 2.828<br>(1.099) |
| Corporate governance | | | | | | |
| Stronger | 34 | 5.971<br>(0.528) | 4.500<br>(1.048) | 4.306<br>(0.802) | 3.304<br>(0.747) | 3.064<br>(1.118) |
| Weaker | 38 | 6.079<br>(0.646) | 4.375<br>(1.028) | 4.621<br>(1.010) | 3.070<br>(0.764) | 2.895<br>(0.879) |
| Auditor's rank | | | | | | |
| Partner | 39 | 6.044<br>(0.606) | 4.141<br>(1.005) | 4.426<br>(0.985) | 2.944<br>(0.718) | 2.637<br>(1.025) |
| Manager | 33 | 6.009<br>(0.582) | 4.780<br>(0.968) | 4.527<br>(0.860) | 3.460<br>(0.722) | 3.374<br>(0.805) |

[a] Because none of the interaction effects were significant, only main effects are reported.

five styles and the two dimensions respectively. Because none of the interaction effects is significant, only main effects are reported.[21] The corporate governance variable, while not significant, is included for completeness.

The size of client factor is significant for the integrating style, with auditors being more likely to use this style when the client is small. A marginally significant difference for the dominating style suggests that auditors may also be more likely to use

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[21] A limitation of the study is the small sample size of seventy-two participants and this may have led to insignificant results being obtained, particularly for the interaction effects.

TABLE 4

THE CONFLICT MANAGEMENT STYLES USED TO RESOLVE THE CONFLICT IN THE SCENARIO—ALL PARTICIPANTS

**Panel A: Conflict management styles**

| Style | Mean (*sd*) | Number of participants[c] whose mean score for this style was | | | | |
|---|---|---|---|---|---|---|
| | | Highest | 2nd highest | Midpoint | 2nd lowest | Lowest |
| Integrating | 6.028<br>(0.592) | 68 | 4 | 0 | 0 | 0 |
| Compromising | 4.434<br>(1.032) | 2 | 34 | 25 | 8 | 3 |
| Dominating | 4.472[a]<br>(0.925) | 4 | 32 | 20 | 13 | 3 |
| Obliging | 3.181[a]<br>(0.760) | 0 | 0 | 19 | 30 | 23 |
| Avoiding | 2.975[b]<br>(0.996) | 0 | 1 | 12 | 20 | 39 |

**Panel B: Conflict management dimensions**

| Dimension | Mean (*sd*) |
|---|---|
| Integrative | 3.053<br>(1.271) |
| Distributive | 1.292[a]<br>(1.186) |

[a] Significantly different from style normally used at $p = .000$ (see Table 2).
[b] Significantly different from style normally used at $p = .05$ (see Table 2).
[c] Includes ties.

reflects the materiality of the inventory adjustment in the scenario and it shows that, while auditors indicate that they adopt the integrating style as their dominant style, they appear to change the way that they handle conflicts according to the nature and materiality of the issue. This is consistent with the contingency perspective (Rahim, 1992, 1997) and also supports recent evidence that the styles are both dispositional and situational (Friedman *et al.*, 2000). It should also be borne in mind that any demand effects leading participants to respond in a like manner to both Part One and Part Two of the instrument would bias the results against obtaining significant differences. These exploratory results suggest the need for further research examining conflicts arising from issues of varying levels of discretion and materiality.

Multivariate analysis (MANOVA) indicated that both the size of client variable and participants' rank are significant ($p = .013$ and $p = .012$, respectively), justifying the need for univariate analysis. Tables 5 and 6 report the results of analyses of variance (ANOVAs) together with the relevant descriptive statistics for the

TABLE 3

A COMPARISON OF CONFLICT MANAGEMENT STYLES AND DIMENSIONS NORMALLY USED BY PARTNERS AND MANAGERS

| | Rank | | |
|---|---|---|---|
| | Partner | Manager | |
| Style | Mean<br>(*sd*) | Mean<br>(*sd*) | Sig. of<br>*t*-test |
| Integrating | 6.139<br>(0.564) | 6.026<br>(0.595) | .411 |
| Compromising | 4.051<br>(0.803) | 4.735<br>(0.773) | .000 |
| Dominating | 4.046<br>(1.050) | 3.824<br>(0.938) | .586 |
| Obliging | 3.513<br>(0.806) | 3.944<br>(0.721) | .020 |
| Avoiding | 2.684<br>(0.915) | 3.626<br>(0.840) | .000 |
| Dimension | | | |
| Integrative | 3.455<br>(1.100) | 2.400<br>(1.200) | .000 |
| Distributive | 0.533<br>(1.398) | 0.231<br>(1.016) | .306 |

attempt to satisfy both parties' concerns to a greater extent than do managers. While these results suggest that auditors may have a disposition towards using an integrating conflict management style, it also appears that adoption of a particular style may be learned from experience. This has important implications for the training of senior staff and is therefore an interesting avenue for future research.

### *Conflict Management Styles Used in the Scenario (RQ2 and RQ3)*

Table 4 shows the overall mean scores for each of the five conflict management styles and the two dimensions used to resolve the specific conflict in the scenario described in Part Two of the instrument.

It can be seen that the integrating style is again the dominant style used by participants. Paired-sample *t*-tests indicate that the mean score for the dominating style is significantly higher than for Part One (see Table 2), with thirty-two participants obtaining the second highest score for this style in the scenario compared to twenty-six for the style normally used. The scores for both the obliging and avoiding styles are significantly lower than for Part One. The mean score for the distributive dimension is significantly higher for the scenario compared to that normally used, suggesting a greater satisfaction of participants' own concerns than those of the client. Overall, these differences suggest that participants favoured the auditor's position in the conflict described in the scenario and were therefore prepared to take a stronger stance against the client position. This no doubt

The implications of these differences raise some interesting research issues. First, the relationship between conflict management style and the final outcome of a conflict in an auditing situation warrants further investigation. It may be that an integrating style is used and yet a solution in between that first chosen by each party is the best option. In reality most solutions to a dispute concerning financial statement amounts or disclosures are likely to fall in between the original preferences of the auditor and the client. While each of the conflict management styles suggests a particular outcome will be achieved, the impact of style on the final outcome was not specifically explored in this study and further research is therefore needed. Second, the distinction between the integrating and compromising styles has been questioned from a conceptual perspective on the grounds that compromising is merely half-hearted integrating (Pruitt, 1983). This may be particularly the case with regard to conflicts in an auditing situation. Third, because the results of this study are based on self-reports, it is possible that they do not reflect what auditors actually do in practice. Responses could be biased in favour of the integrating style because the questions measuring this style appear to be the most appealing to auditors. These issues indicate the need for triangulation of research methods and the use of alternative measures of conflict management styles before firm conclusions can be drawn.

The positive mean score of 2.97 for the integrative dimension indicates that participants attempt to some extent to satisfy the concerns of both parties to the conflict. With a seven-point scale, this score can vary from +6 to –6, with +6 representing maximum satisfaction of both parties' concerns and –6 representing no satisfaction of their concerns. The low positive score (0.395) for the distributive dimension indicates only slightly more satisfaction of participants' own concerns at the expense of the concerns of the client. A score of zero on this scale indicates that both parties' concerns are equally satisfied, while a positive score leans towards the participant's satisfaction and a negative score favours the other party's satisfaction (Rahim, 1992).

Some differences in responses did occur based on rank, age group and years of auditing experience. These three variables are highly correlated with each other, with partners tending to be in the older age group and having more years of auditing experience. Subsequent analysis is based on the rank of participants as an appropriate proxy for experience.[20]

From Table 3 it can be seen that, while there are no significant differences in the use of the integrating and dominating styles based on rank, partners are less likely than managers to use the compromising, obliging and avoiding styles. Partners also score significantly higher on the integrative dimension, indicating that they

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[20] In spite of North American evidence (Gibbins *et al.*, 2001; Abdolmohammadi, 1999), it is possible that the audit managers in the present study had not been involved in negotiating with clients, making their responses less meaningful. As a test of whether this could be the case, an email was sent to the thirteen managers who included their business card with email address when responding to the survey. Of the eleven responses, all but one indicated that they had previously been involved in negotiating with a client concerning a disputed amount in the financial statements. Further, all managers responding had been involved in the audit of a publicly listed company.

TABLE 2

THE CONFLICT MANAGEMENT STYLES NORMALLY USED TO RESOLVE CONFLICTS WITH CLIENTS—ALL PARTICIPANTS

**Panel A: Conflict management styles**

| Style | Mean<br>(*sd*) | Number of participants[a] whose mean score for this style was | | | | |
|---|---|---|---|---|---|---|
| | | Highest | 2nd highest | Midpoint | 2nd lowest | Lowest |
| Integrating | 6.088<br>(0.577) | 68 | 3 | 1 | 0 | 0 |
| Compromising | 4.365<br>(0.856) | 1 | 36 | 24 | 9 | 2 |
| Dominating | 4.106<br>(0.995) | 3 | 26 | 14 | 17 | 12 |
| Obliging | 3.711<br>(0.793) | 0 | 5 | 25 | 32 | 10 |
| Avoiding | 3.116<br>(0.995) | 1 | 3 | 10 | 16 | 42 |

**Panel B: Conflict management dimensions**

| Dimension | Mean<br>(*sd*) |
|---|---|
| Integrative | 2.972<br>(1.256) |
| Distributive | 0.395<br>(1.239) |

[a] Includes ties.

### *Conflict Management Styles Normally Used (RQ1)*

The mean scores for each style are reported in Table 2, together with details of the total number of participants who indicated the extent to which they would adopt each style. Clearly participants overwhelmingly indicated that they primarily choose the integrating style when attempting to resolve conflicts with clients. The compromising and dominating styles are used to a lesser extent while the obliging and avoiding styles are used infrequently. These results can be contrasted with the survey results of Gibbins *et al.* (2001) in their Canadian study. In the latter, respondents indicated that the most common outcome of negotiations was an agreement between the original positions of the client and the auditor. This suggests the use of a compromising conflict management style. Acceptance of the auditor's original position was the next most common outcome from the Gibbins *et al.* (2001) survey and this implies a dominating style. Interestingly, the least common outcome of a new solution being generated during negotiation is the one that suggests the use of an integrating style.

TABLE 1

DEMOGRAPHIC VARIABLES

| | Rank | | |
|---|---|---|---|
| | Partner | Manager | Total |
| Country | | | |
| Australia | 22 | 14 | 36 |
| New Zealand | 17 | 19 | 36 |
| Sex | | | |
| Male | 37 | 21 | 58 |
| Female | 2 | 12 | 14 |
| Age group | | | |
| 40 and under | 15 | 32 | 47 |
| Over 40 | 24 | 1 | 25 |
| Years of experience | | | |
| Less than 10 | 2 | 16 | 18 |
| 10–19 | 12 | 16 | 28 |
| 20 or more | 25 | 1 | 26 |

Statistical tests[17] revealed that there were no differences in responses based on country, firm and sex of participants. Significant differences did occur based on rank, years of experience and age group and these are discussed in the next section.

## RESULTS

### *Reliability Scores*

The internal consistency reliability of the styles for the first two parts of the instrument was measured by Cronbach alpha (Cronbach, 1951). Alpha scores exceeded .73[18] for all styles except for the compromising style in Part One, which attained an alpha score of .62. Omitting one question from this measure[19] resulted in an alpha score of .76. However, omission of this question did not have a significant impact on the results. As the comparable score for the same style in Part Two was .78, it was decided to retain the question in the analysis to enable comparisons to be made.

[17] Analyses of variance and *t*-tests were used where appropriate.

[18] These reliability scores are comparable with those obtained by Rahim (1983a, 1990) when the instrument was developed and by subsequent researchers (King and Miles, 1990; Weider-Hatfield, 1988). They also compare favourably with reliability coefficients obtained for other conflict management instruments such as the MODE and the OCCI (Rahim and Magner, 1995) (see footnote 4).

[19] The question omitted was, 'I negotiate with the client so that a compromise can be reached'.

committee and the board of directors would each help to reach an agreement.[12] Finally, participants were asked to indicate the likelihood that they would qualify their audit opinion if they were unable to persuade the board of directors to obtain an independent opinion or to write down the value of inventory.[13] In addition to determining the influence of the two contextual variables on this decision, the objective of this question was to give an indication of the seriousness with which participants viewed the dispute.

*Part Three.* This part of the instrument comprised demographic questions about the participants' background and experience, including the type of audit firm, their rank within the firm and their years of experience.

### *Participants and Procedures*

Participants were audit partners and managers from two major cities in Australia and two in New Zealand.[14] Gibbins *et al.* (2001) found that partners and managers were the two members of the audit firm most likely to be involved in negotiations with the client.[15] This is supported by Abdolmohammadi (1999), who found that audit managers are frequently involved both in discussions with the client and in meetings with the audit committee. Thus, these two groups would appear to have the appropriate expertise to meaningfully participate in the study, while at the same time providing an opportunity to isolate any differences based on their levels of experience.

A partner in the various branches of each firm was contacted and asked to assist with the study. Those who agreed were given between two and six instruments to distribute to partners and managers. In all, 110 instruments were delivered and seventy-two responses were received, giving a response rate of 65 per cent.[16]

There were thirty-six responses each from Australia and New Zealand, with respondents coming from all of the then Big Five accounting firms and three middle-tier international firms. The great majority of respondents (sixty-eight) were from Big Five firms. Table 1 presents a summary of the demographic variables.

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[12] An eleven-point scale was used ranging from 0 to 10, with the endpoints annotated as 'to a very little extent' and 'to a very great extent'.

[13] An eleven-point scale was again used, with the endpoints annotated as 'highly unlikely' and 'highly likely'.

[14] The Australian participants were located in Brisbane and Adelaide. They were informed that the company in Part Two of the instrument was listed on the Australian Stock Exchange. The New Zealand participants were located in Auckland and Wellington and were advised that the company was listed on the New Zealand Stock Exchange. In all other respects, the instrument was the same.

[15] In the conflict situation chosen by the partners in the Gibbins *et al.* (2001) survey, in 63 per cent of the cases the audit manager was also involved in the negotiation.

[16] As it is possible that some of the instruments were not distributed, the actual response rate of those receiving an instrument is likely to be higher than this figure.

and sale of the inventory. The finance director did not believe that this action was justified. This particular conflict was chosen because it represents a situation which is not covered by an accounting standard and which involves the exercise of judgment. As with any discretionary writedown, there is considerable scope for the auditor to accept or reject the client position.[10]

Two variables in the scenario were manipulated in a between-subjects design. The first variable was the size and influence of the client. In the small client condition, participants were advised that the client was one of the firm's smaller clients. In the large client condition, participants were informed that the company was the firm's largest client with considerable influence in the industry. The second variable was the strength of corporate governance. In the strong governance situation, the company was chaired by an independent chairman, four of the seven directors were independent and the audit committee comprised all independent directors. The auditor was entitled to attend all audit committee meetings while the finance director could be invited to attend. Two audit committee members had accounting expertise and the auditor perceived the committee to be effective. In the weak condition, the CEO was also board chairman and four of the seven directors were executives. While the audit committee comprised the three independent directors, the finance director was entitled to attend all meetings. The auditor, who was also entitled to attend, had perceived that the members had very little accounting expertise and tended to endorse the views of the finance director.

Participants were asked to respond to the same set of statements from the ROCI-II as in the first part of the instrument, with minor modifications to refer to the finance director as the other party in the conflict. It is acknowledged that requiring participants to respond to the ROCI-II statements twice could give rise to demand effects. However, because of research evidence that conflict management styles are both dispositional and situational, it was felt that it would be useful to try and capture the styles generally used by auditors as well as the style used in a particular scenario. The difficulty of obtaining enough participants at partner and manager level precluded the possibility of making this a between-subjects variable. Given that a demand effect would result in identical responses to the two sets of statements, any differences that do occur are more conclusive.

Following the ROCI-II statements, participants were told to assume that they had been unable to resolve the dispute with the finance director. They were asked to indicate the extent to which they believed the CEO, the chairman,[11] the audit

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[10] The nature and materiality of the accounting issue is likely to have an impact on choice of conflict management style. For example, one would expect an auditor to adopt a dominating style if acceptance of the client's position would result in the breach of an accounting standard and possibly an obliging style if the issue was not considered to be material. In this exploratory study, only one issue is explored, thus providing an opportunity for further research.

[11] It should be noted that, in the weak governance condition, these two roles were held by the same person and the instrument therefore described them as the CEO/chairman. In the strong condition, the positions were separate.

*Research Instrument*

The research instrument was divided into three parts. The first part concerned the normal approach that auditors take when resolving conflicts with the client. The second part described a specific scenario where a conflict had arisen between the audit partner and the client's finance director. The final part of the instrument contained demographic questions about the participant. During its development, the instrument was reviewed by five accounting academics with experience in auditing and by a senior audit practitioner. Pilot testing by final year auditing students verified the strength of the manipulations and the clarity of the instrument.[7]

*Part One.* Using a modified version of the ROCI-II, participants were asked how they would normally resolve conflicts with the client concerning financial statement issues. The ROCI-II comprises twenty-eight statements, seven of which relate to the integrating style, six each to the obliging and avoiding styles, five to the dominating style and four to the compromising style. The wording of these statements was modified to refer to the client as the other party in the conflict.[8] Participants were asked to indicate the extent of their agreement with the statement by circling a number on a seven-point numerical scale ranging from Strongly Disagree (1) to Strongly Agree (7).[9]

*Part Two.* This section of the instrument concerned a dispute between the audit partner and the finance director of a listed company concerning the valuation of inventory. Participants were asked to assume that they had been the partner in charge of the audit for the last five years and that they had had a good working relationship with the finance director up to the present. The company was experiencing difficulty maintaining market share and had decided to drop a major product line. Both the finance director and the senior design engineer had advised that the components associated with this product had alternative uses and no write-down of value was necessary. The audit partner, however, believed that inventory could be materially overstated to the extent of 20 per cent of net profit. There was particular concern because both the finance director and the engineer received performance bonuses based on profit. The partner therefore suggested that an independent expert be appointed to give an opinion on the future probable use

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[7] While it is a limitation of the study that no manipulation checks were included in the final instrument, checks incorporated into the debriefing during the pilot test indicated that both manipulations were strong. This was confirmed by those involved in the reviewing of the instrument during its development.

[8] Sample statements are reproduced in the Appendix. The full set of statements is not reproduced for copyright reasons.

[9] The use of a seven-point scale is a further modification of the ROCI-II which uses a five-point Likert scale. The main reason for this modification is that an extension of the study is planned to examine cultural effects on auditors' conflict management styles. Because some cultures avoid using the end-point of scales (Triandis, 1992), there is a danger that responses on a five-point scale may cluster around the midpoint. A wider spread of results is possible if a larger scale is used. As research has indicated that internal-consistency reliability increases steadily up to a seven-point scale (Rosenthal and Rosnow, 1991), this size scale was used for this part of the study.

### *Supplementary Research Questions*

Gibbins *et al.* (2001) report that several people in the client organization are generally involved in the negotiation process with members of the audit firm. Participants in their field survey advised that the chief financial officer (CFO) was almost invariably involved (96 per cent of cases), the chief executive officer (CEO) was frequently involved (59 per cent) and the audit committee was sometimes involved (40 per cent). Increased knowledge of interactions between the auditor and members of the client company can lead to a greater understanding of how conflicts are resolved if there is an impasse between the auditor and the CFO. To gain further insight, in addition to examining conflict management styles, the present study sought to identify the various members of the client company who might assist the auditor to resolve a dispute with the CFO. When the dispute cannot be readily resolved, to what extent does the auditor involve other members of the client company such as the CEO, the board chairman, the audit committee and the board of directors? Does the level of assistance from these parties vary according to the size of the client or the strength of its corporate governance structures? Finally, if a dispute cannot be resolved, do the two contextual variables manipulated in the scenario influence the auditor's decision to issue a qualified audit report?

## RESEARCH METHODS

This exploratory study uses an experimental design based on the conflict management inventory developed by Rahim (1983a, 1990), known as the Rahim Organizational Conflict Inventory-II or ROCI-II.[4] This inventory measures the five conflict management styles of dominating, avoiding, obliging, compromising and integrating. While originally developed to measure conflict in an organizational setting, it has since been tested in numerous studies[5] in many different conflict settings and has been found to have a high degree of validity and internal consistency (Weider-Hatfield, 1988; King and Miles, 1990; Rahim, 1992).[6]

[4] Two other widely used instruments are the Management of Differences Exercise or MODE (Kilmann and Thomas, 1977) and the Organizational Communication Conflict Instrument or OCCI (Putnam and Wilson, 1982). The MODE has been criticized for its weak convergent validity and its ipsative nature (Womack, 1988a, 1988b; Kabanoff, 1987). The OCCI is more concerned with the role of communication in conflict management and has been criticized for its reliance on student subjects during its development (Knapp *et al.*, 1988).

[5] The roci@LISTS.WKU.EDU internet list reveals that some 200 journal articles, dissertations and working papers have used the instrument. Seventy journal articles have been published in various management and psychology journals including *Academy of Management Journal, The International Journal of Conflict Management, Journal of Psychology, Journal of Applied Psychology* and *Journal of Social Psychology.*

[6] While the ROCI-II is a well-established instrument, there are a number of limitations associated with its use in this study. First, because it was originally developed for an organizational context, it may not adequately capture the differences in styles in an auditor–client situation. Second, it relies on the self-reports of respondents and therefore suffers from the possibility of demand effects and a self-serving bias. This may be particularly so with regard to the integrating style where the questions appear to be more agreeable in an auditing context. Third, it focuses on the initial style adopted by one of the parties to the conflict, thereby failing to capture the dynamic process of negotiation.

the client's affairs, it is likely that a large client will be in a superior bargaining position.

There are two counter arguments suggesting that auditors may be less willing to give in to the wishes of a large and influential client. First, they may consider the consequences of audit failure to be more serious. Engagement risk (Hackenbrack and Nelson, 1996), comprising the risk of litigation costs and loss of reputation, is likely to be greater when the client is larger. This may lead auditors to adopt a more dominating style to persuade the client to accept their position. Second, the transaction costs of switching auditors are greater when the client is larger (DeAngelo, 1981), and this gives the auditor an inherent advantage when resolving conflicts.

Thus, there are conflicting theoretical predictions concerning the impact of client size on conflict resolution. Furthermore, Gibbins *et al.* (2001), in their survey of audit partners, report that practitioners claimed that the size of the client was not a consideration when negotiating to resolve a dispute. In view of these inconsistencies, the following research question is explored:

RQ2: Is the conflict management style used by the auditor to resolve a dispute with the client affected by the size and influence of the client?

*Corporate Governance Mechanisms.* One of the benefits of strong corporate governance is the enhancement of auditor independence (Knapp, 1987; Cadbury, 1992; McMullen, 1996). A strong and active audit committee comprising independent directors can act as an intermediary between the auditor and client management. Knapp (1987) reports that audit committee members appear to support auditors rather than management in the event of a dispute. Beasley (1996) found that a greater proportion of outside directors on the board significantly reduces the likelihood of financial statement fraud. It has also been argued that an independent chairman can enhance the monitoring role of the board and avoid a concentration of power (Cadbury, 1997).

In contrast, however, Cohen *et al.* (2000) report that audit practitioners involved in exploratory interviews expressed concerns over the effectiveness of audit committees, with some partners suggesting that audit committees are not powerful enough to resolve conflicts with management. This is consistent with Gibbins *et al.* (2001), who also found that audit partners were concerned about wide differences in audit committee effectiveness.

An interesting question, therefore, is whether strong governance mechanisms enhance the power of the auditor relative to the client, thereby affecting the way that auditors resolve disputes with client management. For example, it could be that auditors are prepared to use a more dominating style of conflict management when they know that they can rely on the support of a strong audit committee. This gives rise to the following research question:

RQ3: Is the conflict management style used by the auditor to resolve a dispute with the client affected by the strength of the client's corporate governance structures?

expect to see an integrating or compromising approach taken as the dominant style, but with aspects of the dominating style being used if the auditor were required to take a firm stand. If independence is being compromised, then aspects of the obliging style could be evident.

Prior research has not identified which conflict management styles are favoured by auditors when dealing with disputes with clients. Further, it is not known whether auditors use a consistent style regardless of the nature of the conflict or whether they adapt their style to a particular situation. The following research question is explored to identify the styles that auditors indicate they normally use to resolve disputes and to enable comparison with the way that disputes are resolved in a specific situation:

RQ 1: What conflict management styles are normally used by auditors to resolve a dispute with the client concerning material misstatements in the financial statements?

### *The Contextual Variables*

As discussed in the previous section, the conflict management literature indicates that the approach to resolving a conflict may be influenced by the specific conflict situation. To explore whether this is the case, two variables were manipulated to assess their impact on auditors' choice of conflict management style. These variables were the size and influence of the client and the strength of the client's corporate governance mechanisms. These were chosen because they both influence the client's power relative to the auditor's power (Goldman and Barlev, 1974; Nichols and Price, 1976; Knapp, 1985; Windsor and Ashkanasy, 1995).

*The size and influence of the client.* The results of prior research suggest that some auditors may be willing to waive an adjustment in order to retain the client (Wright and Wright, 1997; Braun, 2001). This is likely to be especially so when the client is a large and influential company because the loss of audit and other advisory services fees will almost certainly be greater (Lord, 1992; Krishnan and Krishnan, 1996; Wright and Wright, 1997). In addition, the audit firm could suffer a loss of reputation due to the publicity surrounding the audit switch. As a result, the balance of power may favour the client, leading the auditor to adopt a compromising or even an obliging style and lean towards accepting the client's position.*

Differences in the parties' capabilities may also affect the relative power between the client and the auditor. Gibbins *et al.* (2001) suggest that the auditor's knowledge of the financial affairs of the client is restricted by cost constraints and the size of the client's accounting records. This implies that the larger the client company, the more complex its structure is likely to be and hence it becomes more difficult for the auditor to have a comprehensive understanding of the client's affairs. In contrast, the auditor is likely to have superior knowledge with regard to accounting standards and methods. Thus, in a conflict situation not covered by an accounting standard and involving a judgment requiring an in-depth knowledge of auditor and the client, resulting from the auditor's wish to retain the client and the client's wish to minimize audit costs and to use the report to attract capital (Gibbins *et al.*, 2001).

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* Editor's note: It should be noted that this was written before full details of the Enron/Andersen fiasco and the sagas at WorldCom and Xerox became known.

However, it could also be argued that, given the auditor's asymmetric loss function in terms of litigation risk and loss of reputation resulting from audit failure, a win–win outcome might not always be beneficial to the auditor. The Andersen demise attests to this. This suggests a contingency approach to conflict management whereby one conflict management style 'may be more appropriate than another depending on the situation' (Rahim, 1997, p. 72). A number of researchers have adopted this approach (Hart, 1981; Thomas, 1977; Rahim, 1992, 1997). Rahim (1992, 1997) suggests that the integrating style is more appropriate when issues are complex and when synthesis of ideas and commitment from both parties are needed to resolve the problem. This would appear to be the case in many conflicts between the auditor and the client. It is argued that a dominating style may be better when the issue is less important to the other party, a speedy solution is needed and one is more powerful than the other party (Rahim, 1992, 1997). In an auditing context, if there is unwillingness to make any concessions because the auditor believes that the financial statements are materially misstated, a dominating style may be appropriate. The auditor will stand firm and the client will either agree to the auditor's recommended changes to the financial statements or accept a qualified audit report. This style would therefore appear to be consistent with a strong approach to audit independence. The obliging style is considered to be more appropriate when the person is in a weaker position than the other party, the issue is more important to the other party, and preserving the relationship is important. It could be argued that an auditor who is concerned that a client may be lost may choose this style, succumbing to pressure to accept the client's position. However, from a professional point of view, this would be regarded as a compromise of independence. An avoiding style is considered suitable when the issue is relatively unimportant and there are potentially dysfunctional outcomes from confronting the other party. It is unlikely that this style would ever be appropriate for any material dispute between the auditor and the client.[3] Finally, a compromising style is regarded as appropriate when the goals of the parties are mutually exclusive, when both parties are equally powerful and when consensus cannot be reached. From an auditing perspective, it would appear that this style may be appropriate when the issue is less complex but still material.

Prior research has also found that the styles themselves are not mutually exclusive (Psenicka and Rahim, 1989; Lee, 1990; Ting-Toomey *et al.*, 1991; Trubisky *et al.*, 1991). While people may adopt a particular style as the dominant one in a given situation, they may also use aspects of the other styles according to the circumstances and nature of the conflict. Thus, in an auditing context, we could

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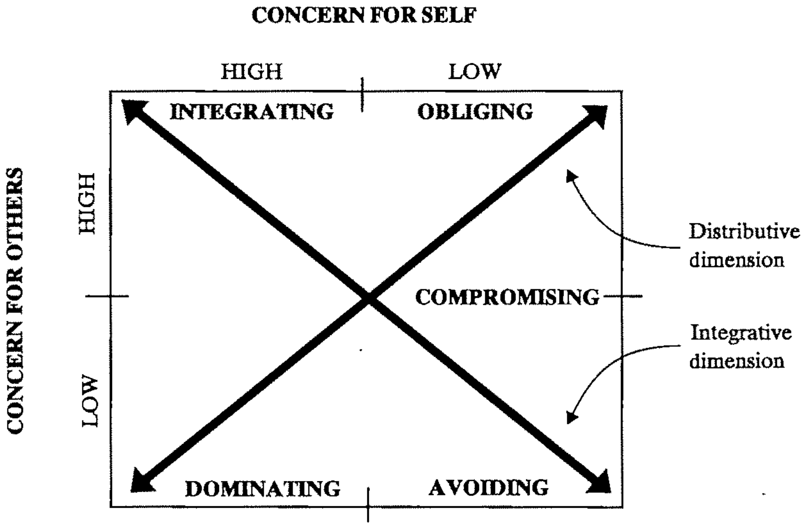
[3] Because using an avoiding style does not seem to be an option for the auditor, it could be argued that this style should not be included in a model of auditors' conflict management styles. However, all five styles are an integral part of the conflict management model used in this study and the model would be incomplete if one of the styles were omitted. Nonetheless, empirically we would expect to find the avoiding style to be the style least used by auditors.

FIGURE 1

A TWO-DIMENSIONAL MODEL OF STYLES OF HANDLING INTERPERSONAL CONFLICT



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assume that conflict management styles of auditors are dispositional. Recent research evidence suggests, however, that styles are partly dispositional and partly situational (De Dreu and Van Lange, 1995; Graziano *et al.*, 1996; Olekalns and Smith, 1999). According to Friedman *et al.* (2000, p. 34), 'to accept the view that the situation influences how people approach conflict does not, however, require one to reject the presence of dispositional tendencies'. This means that individuals may adopt a consistent style over a variety of conflicts but also adapt their approach to the specific circumstances of a particular conflict.

There has also been debate about which conflict management style is the most appropriate to use to achieve a particular outcome. Some writers regard the integrating style as the superior style and thus the most appropriate in all circumstances (Blake and Mouton, 1964; Burke, 1970; Likert and Likert, 1976; Van Slyke, 1999). Integrating is the only conflict management style that considers the interests of both parties and focuses on mutual gains. It is therefore argued that this style produces superior outcomes with more open exchange of information and a higher level of satisfaction through exploring the conflict issues more comprehensively (Van Slyke, 1999). This style could be regarded as more appropriate from an audit perspective because both the auditor and the client would prefer a win–win outcome. This is because there is a jointness of interests between the

Magner, 1995). Persons adopting this style seek to impose their views upon the other party, using forcing behaviour if necessary, with the intended outcome of getting their position accepted.

*Obliging Style (low concern for self and high concern for others, a lose–win outcome).* This style involves playing down differences in order to satisfy the concerns of the other party. An obliging person is unassertive and cooperative (Rahim and Magner, 1995), having little regard for their own position (Rahim, 1992). Effort is made to smooth over the conflict out of fear of harming the relationship (Frederickson, 1997). The expected outcome would be an acceptance of the other party's position.

*Avoiding Style (low concern for self and others, a lose–lose outcome).* This style is considered to be both unassertive and uncooperative (Rahim and Magner, 1995). A person adopting this style exhibits an unconcerned attitude towards the issue, failing to satisfy their own concerns as well as the concerns of the other party. In this situation, the likely outcome is that the conflict will remain unresolved (Friedman *et al.*, 2000).

*Compromising Style (intermediate in concern for self and others, a no win–no lose situation).* A person using this style takes a 'middle-ground position' (Rahim, 1997, p. 62) involving give and take. Neither party's preferred outcome is achieved, with both giving up something in order to achieve a mutually acceptable decision (Rahim, 1992). The style involves both assertiveness and cooperativeness but to a lesser extent than the integrating style (Rahim and Magner, 1995). Interestingly, Pruitt (1983) argues that compromising is not a distinct style in itself but rather constitutes half-hearted integrating.

*Integrative and Distributive Dimensions of the Conflict Management Styles.* Thomas (1976) suggested that further insight into the five conflict management styles can be obtained by organizing them into the integrative and distributive dimensions as constructed below:

$$\text{Integrative Dimension} = \text{Integrating Style} - \text{Avoiding Style}$$

$$\text{Distributive Dimension} = \text{Dominating Style} - \text{Obliging Style}$$

These dimensions are closely related to the concepts of integrative and distributive bargaining put forward by Walton and McKersie (1965) in the context of labour negotiation (Rahim, 1992, 1997). The integrative dimension measures the amount of satisfaction of concerns received by both parties to the conflict while the distributive dimension measures the amount of satisfaction of concerns received by one of the parties at the expense of the other party.

Figure 1 models the five conflict management styles together with these dimensions.

There has been considerable debate about whether conflict management styles are dispositional or situational (Friedman *et al.*, 2000). Some writers regard the styles as 'stable over time and across situations' (Friedman *et al.*, 2000, p. 33) while others believe that an individual chooses a style to match the particular conflict (Knapp *et al.*, 1988) or relationship (Rahim, 1992). Brody *et al.* (1998), in their study of the interface between internal and external auditors, appear to outcome (Psenicka and Rahim, 1989; Neale *et al.*, 1989; Thompson, 1990). The behavioural characteristics of bargaining strategy include the negotiating or conflict management style used by the parties involved (Psenicka and Rahim, 1989; Rojot, 1991).

Conflict management styles have been the focus of considerable research over many decades in disciplines other than auditing (Follet, 1940; Blake and Mouton, 1964; Rahim, 1989, 1992). An important contribution was made by Blake and Mouton (1964), whose organizational model of conflict handling styles has been adapted for wider use by a number of researchers (Hall, 1969; Thomas and Kilmann, 1974; Rahim, 1983b). In this study, I focus on the Rahim (1983b) model, which has been used extensively in studies concerned with managing conflicts in business organizations (Rahim and Magner, 1995). In this context, it is argued that conflict between subordinates and superiors and between co-workers must be managed appropriately in order to minimize any negative impact on organizational efficiency (Rahim, 1992). While the model was originally developed in an organizational context, its use has been extended to evaluate conflict in many other settings including schools and universities, and family and other interpersonal relationships (McCombs *et al.*, 1988; Cornille *et al.*, 1999; Gilani, 1999). Of particular note is its use in cross-cultural settings to measure differences in styles used when negotiating in joint-venture agreements across cultures (Tse *et al.*, 1994). More recently, it has been used across organizational boundaries to examine conflicts between managed care organizations and health care providers (Callister *et al.*, 2001). Thus, the model is not restricted to interpersonal conflicts within organizations but is considered to be relevant whenever two or more parties are involved in a 'struggle over claims to resources, power and status, beliefs, and other preferences and desires' (Bisno, 1988, pp. 13–14). It would therefore appear to provide an appropriate basis for exploring how auditors manage conflicts with clients concerning financial statement disclosures.[2] The model is based on two dimensions described as concern for self and concern for others and five conflict styles described as integrating, dominating, obliging, avoiding and compromising.

*Integrating Style (high concern for self and others, a win-win outcome).* This style involves collaboration and an open exchange of information to achieve an outcome which is agreeable to both parties (Rahim, 1997). It is therefore regarded as being both assertive and cooperative (Rahim and Magner, 1995). Conflicts are resolved by constructively exploring differences and searching for new solutions that go beyond what each party first envisioned (Rahim, 1992).

*Dominating Style (high concern for self and low concern for others, a win–lose outcome).* This style is considered to be assertive and uncooperative (Rahim and

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[2] It is recognized that other members of the audit firm, notably the technical partner, the review partner and the managing partner, will be involved in resolving major financial statement disputes with clients (Gibbins *et al.*, 2001). However, consistent with prior studies which have focused on an individual perspective (Brody *et al.*, 1998; Trotman *et al.*, 2002), this study explores individual conflict management styles as a first step to understanding conflict management in an auditing context. Future research should therefore examine audit team conflict management styles and the impact of other members of the audit team on auditor–client negotiation styles.

1997; Braun, 2001), with auditors being less willing to compromise when the issue is a serious one such as a going concern qualification (Craswell, 1988).

While these studies have examined various aspects of auditor–client conflict, research on the actual negotiation process used to resolve conflicts is limited and, until recently, has been largely restricted to the development of game theoretic models (Antle and Nalebuff, 1991; Zhang, 1999). Murnighan and Bazerman (1990) suggest that economic models of this nature do not fully explain negotiator behaviour in accounting and auditing and hence there is a need for more behavioural research. The paucity of behavioural studies is now being addressed, with recent contributions by Brody *et al.* (1998), Gibbins *et al.* (2001) and Trotman *et al.* (2002).

Brody *et al.* (1998) examine the impact of auditors' conflict management styles on their reliance on the work of internal auditors.[1] Drawing on the conflict management literature, they contend that the outcome of a conflict in an auditing situation will be influenced by the conflict management styles of those involved.

Gibbins *et al.* (2001) develop a model pertaining to negotiation in the auditor–client setting. Their model consists of a three-element process comprising the accounting issue, the auditor–client process and the accounting outcome. The authors indicate that both interpersonal factors and the parties' capabilities, including negotiation expertise, can affect the negotiation process. To assist in the development of their model, Gibbins *et al.* undertook a survey of senior practitioners in Canada, who were asked to reflect on a specific negotiation with a client. The most common outcome of the negotiations was an agreement in between the original positions taken by the auditor and the client.

Trotman *et al.* (2002) examine the effectiveness of two negotiation intervention methods (role-playing and passive intervention) in enhancing auditor–client negotiations. These methods are expected to lead to collaborative negotiation which reduces conflict and is more likely than competitive negotiation to lead to a win–win situation. Trotman *et al.* stress the importance of effective negotiations in the reporting of additional financial statement disclosures or potential misstatements, particularly in view of the auditor's desire to limit conflict with the client while at the same time maintaining independence and reputation. They suggest that 'poorly conducted negotiations in which the auditor "wins" a preferred position may result in ill-will, unnecessarily creating auditor/client conflict, and client loss' (p. 4).

These research studies point to the potential importance of the conflict management style used by auditors when negotiating with clients, thereby supporting the need for research in this area.

### *Negotiation and Conflict Management Styles*

An important part of the negotiation process to resolve a dispute is the bargaining behaviour or strategy of the parties involved (Murnighan and Bazerman, 1990; Gibbins *et al.*, 2001) and this can have a significant impact on the negotiation the size (and influence) of the client and the strength of the client's corporate governance mechanisms. In addition to exploring the conflict management styles used, the individuals or groups whom the auditor would expect to help solve the dispute are also identified.

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[1] Brody *et al.* (1998) used the Organizational Communication Conflict Instrument (OCCI) developed by Putnam and Wilson (1982) to measure conflict management styles of auditors. This instrument is discussed further in footnote 4.

Brody *et al.* (1998) is the only other study to measure conflict management styles in an auditing context. There, conflict management style was measured as an independent variable influencing the external auditor's reliance on the work of internal auditors. The present work is the first to consider conflict management style as a dependent variable. The study is exploratory in nature and, while subject to a number of limitations, it lays a foundation for further investigation of conflict management in auditing. The topic is important because the auditor's inquiry of management concerning financial statement issues can lead to conflict between the auditor and the client, particularly if the auditor deems that additional testing is required (Brody *et al.*, 1998). Conflict may be resolved by negotiation (Gibbins *et al.*, 2001). Here, the dynamics of bargaining will be important in an auditing situation (Murnighan and Bazerman, 1990). A key aspect of bargaining strategy is the style of conflict management adopted by the parties to the conflict (Psenicka and Rahim, 1989; Rojot, 1991). Conflict management style can influence not only the outcome of the current issue under dispute (Ting-Toomey, 1986; Wilson and Waltman, 1988; Schwenk, 1990; Brody *et al.*, 1998) but also the resolution of future issues that may arise (Gibbins *et al.*, 2001).

## BACKGROUND AND RESEARCH QUESTIONS

### *Conflict and Negotiation Between the Auditor and the Client*

The process of expressing an opinion on the client's financial statements inevitably leads to a certain amount of conflict between the auditor and the client (Wright and Wright, 1997; Gibbins *et al.*, 2001). Before the auditor is willing to provide an unqualified audit report, any issues that have arisen throughout the audit must be resolved. During the resolution process, the client is likely to attempt to persuade the auditor to accept the client position.

The auditor's ability to withstand pressure from a client is, *inter alia*, a function of the client's source of power relative to the auditor's source of power (Goldman and Barlev, 1974; Nichols and Price, 1976; Murnighan and Bazerman, 1990). Research has shown that factors such as the risk of losing the client (Farmer *et al.*, 1987; Trompeter, 1994; Goodwin and Trotman, 1995; Wright and Wright, 1997; Braun, 2001), and the provision of management advisory services (Knapp, 1985; Lindsay, 1989, 1990; Gul, 1991) may influence auditors to accept the client position in a dispute. In contrast, however, the threat of litigation (Farmer *et al.*, 1987; Goodwin and Trotman, 1995; Krishnan and Krishnan, 1996), the size of the audit firm relative to the client (Knapp, 1985; Lindsay, 1989, 1990; Gul, 1991) and the auditor's level of moral reasoning (Windsor and Ashkanasy, 1995; Tsui and Gul, 1995) have been found to influence the auditor's ability to resist pressure from management. Not surprisingly, the nature and materiality of the issue under dispute is also seen as influencing the outcome of the conflict (Wright and Wright,

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# Auditors' Conflict Management Styles: An Exploratory Study

This study explores the conflict management styles used by auditors when resolving disputes with clients concerning financial statement issues. Rahim's (1983a, 1990) ROCI-II conflict management instrument was used to establish both the styles generally used and also those used in a scenario concerning possible inventory obsolescence. Size of the client and the strength of its corporate governance mechanisms were manipulated in the scenario. It was found that auditors indicate that they primarily use the integrating style to resolve disputes. The compromising and dominating styles are used to a lesser extent while the obliging and avoiding styles are rarely used. Partners are more likely than managers to use more assertive styles of conflict management. The size of the client and the strength of corporate governance mechanisms in place have a significant but relatively minor impact on the choice of styles. The study also identifies the parties whom the auditor would expect to help resolve the dispute. It was found that, when resolving a dispute with the client's chief financial officer, the audit committee is perceived to give the most assistance, followed by the chief executive officer.

**Key words:** Auditing; Conflict management styles.

Audited financial statements are the outcome of a resolution process (Antle and Nalebuff, 1991; Wright and Wright, 1997), involving negotiation between the auditor and the client (Gibbins *et al.*, 2001). The way that the auditor deals with issues under dispute can have a significant effect on audit independence and on the credibility of financial statements. While studies have identified factors that might influence the auditor's decision to accept the client position in a dispute (Knapp, 1985; Farmer *et al.*, 1987; Trompeter, 1994; Windsor and Ashkanasy, 1995; Tsui and Gul, 1995; Goodwin and Trotman, 1995; Wright and Wright, 1997), there has been limited research on the actual negotiation process that takes place between the auditor and client management in order to reach an outcome.

Antle and Nalebuff (1991) use game theory to examine the role of auditor-client negotiation while Gibbins *et al.* (2001) develop a negotiation model, based on the results of a field questionnaire. The purpose of the present study is to explore negotiation and conflict resolution from a behavioural perspective. Using a modified version of an instrument developed by Rahim (1983a, 1990), I identify the conflict management styles of auditors in general and their styles relating to a specific contextual situation. In this situation, two variables are manipulated, these being

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'believes that SAS No. 60 should be modified to provide for the addition of other specified third parties as named report users by changing the last sentence of paragraph 10 of SAS No. 60 to read "When there are requirements established by governmental authorities or other specified third parties named in contractual agreements to furnish such reports, specific reference to such regulatory reports, specific reference to such regulatory authorities or other specified third parties may be made." ' Mr. B 'believes there is no conceptual basis for distinguishing between regulators (who can be named as report users in SAS No. 60) and other specified third parties named in contractual agreements, such as lenders named in loan agreements that specify that the lender is to receive a SAS No. 60 report.'

*SAS 84: Communications Between Predecessor and Successor Auditors*

Letters classified as against: None

Assent with qualifications: None

Dissent: None

*SAS 85: Management Representations*

Letters classified as against: None

Assent with qualification: None

Dissent: None

*SAS 86: Amendment to Statement on Auditing Standards No. 72, Letters for Underwriters and Certain Other requesting Parties*

Letters classified as against: None

Assent with qualification: None

Dissent: None

*SAS 87: Restricting the Use of an Auditor's Report*

Letters classified as against: None

Assent with qualification: Richard Dieter (Arthur Andersen & Co.)

Dissent: None

Firm B** Letter: Appendix B—'We note that the distribution of SAS 60 reports to other unnamed third parties is not precluded by this proposal (although we recognize that as unnamed, they would not be able to assert reliance on the report). As such, the client may be contractually bound (e.g., through a loan agreement) to provide such a report to an unspecified user. We recommend, therefore, that the revision be made to SAS no. 60 paragraph 10 as follows (paragraph 12 would remain unchanged): "when there are requirements established by governmental authorities or set forth in contractual agreements between the entity and a third party to furnish such reports, specific reference to such regulatory authorities or specified third parties should be made." '

ASB member B's assent with qualification: Mr. B 'qualifies his assent because he disagrees with the amendment to SAS No. 60, Communication of Internal Control Related Matters Noted in an Audit, covered in appendix B, "Amendment of Paragraph 12 of Statement on Auditing Standards No. 60, *Communication of Internal Control Related Matters Noted in an Audit*," of this Statement in which the words "or other specified third party" are deleted from the illustrative report in paragraph 12 of SAS No. 60.' Instead, Mr. B

In summary, we strongly believe that the proposed elimination of the mandatory uncertainties paragraph is, at best, premature, and more likely, unnecessary.'

ASB member E's dissent: 'He believes that uncertainty paragraphs are helpful to financial statement users by highlighting those significant uncertainties that are either reasonably possible or probable of resulting in a material loss.

Mr E 'does not believe that persuasive evidence has been presented that demonstrates that financial statement users will benefit from the elimination of the mandatory uncertainties paragraph, that use of the mandatory uncertainties paragraph currently being abused, or that he implementation of Statement of Position (SOP) 94-6, *Disclosure of Certain Significant Risks and Uncertainties*, will cause the use of such paragraphs to increase. Moreover, even if SOP 94-6 does cause an increase in such paragraphs, he is not persuaded that this would be undesirable since, he believes, these paragraphs are meaningful to financial statement users.'

*SAS 80: Amendment to Statement on Auditing Standards N. 31, Evidential Matter*

Letters classified as against: None

Assent with qualification: None

Dissent: None

*SAS 81: Auditing Investments*

Letters classified as against: None

Assent with qualification: None

Dissent: None

*SAS 82: Consideration of Fraud in a Financial Statement Audit*

Letters classified as against: None

Assent with qualification: Edward F. Rockman (Alpern, Rosenthal & Co.; no letter on file), Charles McElroy (Larson, Allen, Weishar & Co.; no letter on file), Glenn Vice (Kelton and Company; no letter on file).

Dissent: None

*SAS 83: Establishing an Understanding With the Client*

Letter classified as against: None

Assent with qualification: None

Dissent: None

rather than just the one where the contract was fulfilled—the new contract between the promisor and a new promisee, and the dispute between the original parties to the contract over damages. Damages cases typically are never simple and involve lengthy negotiations, leading to high transaction costs. Friedmann (1989, p. 24) claims that the theory of efficient breach 'fails as a general proposition on grounds of efficiency. Its sole purported advantage is that it reduces the level of transaction costs by removing the need of the promisor to negotiate a release from the promisee. But the gains here are generally illusory because the unilateral decision by the promisor provokes a dispute over damages that may end in costly litigation.'

It is argued by proponents of efficient breach theory that if restitutionary damages were allowable, whereby the promisor would lose all the gains derived from the breach, this would have a negative effect on economic activity. In other words, such damages would in effect raise the cost of breach (the expected net gains are less), and as this activity is now more costly, parties will engage less often in this behaviour. This prediction follows from standard microeconomic theory—if the marginal cost of an activity increases, while the marginal benefits of that activity stay constant, then in equilibrium a lower level of that activity will occur.

It does not follow, however, that the imposition of restitutionary damages would eliminate all contract-breaching actions. In a world of uncertainties; imperfect information on business dealings, on the long-term costs of breach (including on reputation) and on judicial attitudes to sentencing; the impossibility of predicting whether promisees will take action for breach, and of how the courts will decide any given case; and on the transaction costs of dealing with all these information asymmetries, there will most likely still occur a positive level of breach in contracts.[4]

These factors will always be present, regardless of whether restitutionary damages are available or not, such that there will always exist a (constrained) optimum number of efficient breaches which is neither the maximum theoretically possible number of them, nor zero. It is only in a world of perfect and therefore symmetrical information between all parties to a contract (and hence no transaction costs) that the unconstrained optimum number of efficient breaches could occur, and here, regardless of which party legally holds the right to break the contract, the optimum allocation of resources will occur and all parties can maximize the gains from bargaining over the returns made from the breach of contract.[5]

It is important to realize that, from an economic perspective, the same social benefits will accrue regardless of where the law places the entitlement. This principle was first developed by Coase (1960), in what has become known as the

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[4] At first, if disgorgement becomes available, breaches may occur rarely. But as case law builds up, potential breachers can form a probability distribution of expected damages to be awarded for particular kinds of breach, and from this can compute the total expected net benefit from breach. If this is positive, in the long-run expected value sense, then it would pay the promisor to breach the contract.

[5] Exposition of this approach may be found in any intermediate microeconomic theory textbook, such as Eaton *et al.* (1999, pp. 579*ff*).

Coase theorem. This states that it does not matter who owns the legal right to breach a contract, but only so long as information is free and symmetrical, and there are accordingly no transaction costs between the parties. The optimal outcome will always occur through trading between the individual parties to the contract, where parties are free to delineate their own rights. Transaction costs can thwart the process of efficient bargaining. In the presence of asymmetric information, there can still be gains from trade, but cheating on a contract can occur through opportunistic behaviour by the party with the most information. Here property rights are incomplete and the Coase theorem does not apply. The task for society here is to devise a set of rules that hinders the ability to cheat while at the same time preserving the ability to maximize the use of resources.

Clearly, in such situations, which in reality constitute the norm in the commercial world, the rules of the game matter, in determining the outcome of a breach in contract. In situations where there are transaction costs due to imperfect information, and where bargaining between the parties to settle a contractual dispute would be very costly, the courts tend to assign property rights to those parties to the contract that could on average be expected to be the ones most likely to produce the greatest increment to social welfare. This will of course increase their wealth at the expense of those who are not given these rights.

A simple explanation of efficient breach theory follows. Suppose that A contracts with B to perform services worth $1,000 in profits to B. A then finds that it could sell the same services to C for an additional profit to A of $1,500, and withdraws them from B, paying $1,000 as compensation to B. A is still better off by an amount of $500. There are no contracting, information or search costs involved in the process. As B was fully compensated for the loss caused by the breach in contract, and as A is now $500 better off than before the contract was signed with B, then society as a whole is better off by $500 and a more efficient use of resources has occurred, and accordingly social welfare has increased.

In this example, it was implicitly assumed that neither party enjoyed the legal right to fulfilment of the contract. A acted simply according to the dictates of economic efficiency. If, in contrast, that right were owned by B, then if A breached by selling the services to C, and if B still wanted the services, A would have to pay B the foregone profits of $1,000 for the services promised but not provided to B. But A is still $500 richer than if the original contract had been adhered to, as it has obtained $1,500 in profits by selling to C. Total social wealth has increased by $500. Now assume, instead, that the right over the contract was held by A. Here, A could simply go ahead and sell to C, getting an additional profit of $1,500. But the social gain is less than this, by the amount of $1,000 which B can no longer achieve due to the fact that it cannot secure the services from A. Once again, the net social gain is $500, but the distribution of the gains is quite different as between A and B.

From an overall economic perspective, this difference in the resulting income distribution is completely irrelevant where the distribution of gains is regarded as value-neutral (each party places the same value on a dollar lost or gained). From an holistic perspective, social wealth has increased by the same amount ($500) in each case, regardless of which party owns the rights to the contract. In the absence of transaction costs, trading between the parties will always yield the socially efficient outcome (in this case, A selling to C rather than B), no matter which party has the property rights.

The previous two examples represented polar outcomes. Other solutions are possible in between these extremes if the parties can bargain in the absence of transaction costs. A rational person in the position of A will offer a degree of compromise with B, and a rational B should accept. The maximum amount that A could offer B in order to breach the contract without any repercussions would be $1,499, as above this amount A would either only break even or would lose, and the minimum acceptance threshold for B is $1,000, as below this he would be worse off. For example, A might agree to offer B $1,100, and would still be better off by $400 than by honouring the original contract. B would then be $100 better off. If B were better at bargaining, B might be able to extract $1,400 from A, thereby being $400 better off, and A would still be $100 better off in selling to C than if it had honoured the contract with B. Note that under any of the scenarios considered, the total net gain to society from a breach remains constant at $500. The only difference is the *distribution* of the fruits of the net gain from the breach.

The Coase theorem only applies in the absence of transaction costs which, if included within the model, create a type of bilateral monopoly situation of unequal bargaining power. As Posner (1998, pp. 68–9) points out, in such a bilateral monopoly there is only one buyer and one seller, and this implies prohibitive transaction costs. In reality, the problem is that A and B will often not settle due to these transaction costs. If A and B cannot agree on how to share the net gains from the breach, then the gain to society will not materialize. As this will diminish social welfare, the supporters of efficient breach theory say A must be allowed simply to take the opportunity, free of any negotiation. However, even if efficient breach suggests A take the opportunity, negotiation is not totally excluded. The level of compensation to B has to be negotiated, and if A and B cannot settle, then B must litigate.

The rational economic perspective suggests that if the expected transaction costs for A are greater than the potential profit, then the opportunity to contract with C will be foregone. There is also a real likelihood the negotiation costs to B will exceed any profit, such that the overall economic impact on society could even be negative, in the sense that the original social-wealth-creating contract will not be signed or put into effect.

The natural implication of this, all other things being equal, is that from an economic perspective we should select the rule which requires contractual rights to be purchased, rather than allowing them to be expropriated. The theory of efficient breach does however offer support for parties defining their own ambit of rights at a contractual level. In reality, there is the need for an appreciation of the transaction costs associated with the negotiation and bargaining process, including the associated opportunity cost of the time spent in negotiation and any current or future lost profit opportunities.

Posner (1998, p. 131) distinguishes between opportunistic breaches and other breaches of contract. He advocates restitution as an attractive remedy to deter opportunistic breaches, of the type where B pays A in advance for goods and instead of delivering them A uses the money in another venture. In such circumstances Posner advocates restitution as an attractive deterrent remedy, arguing that the opportunistic contract breaker should be made to 'hand over all his profits from the breach to the promisee; no higher sanction would deter'. However, he does not elaborate on why opportunistic breaches should be discouraged if they are efficient.

Friedmann (1989, p. 4) criticizes this approach as being diametrically opposed to the efficient breach theory, 'the essence of which is that the promisor should be allowed or even encouraged to commit a breach whenever his gains exceed the promisee's loss'. He concludes (at p. 23) that the efficient breach theory of contract runs counter to the very basis of private law. Parties should be free to define the ambit of their rights in a contractual setting. However, for this process to work efficiently (and, dare we say it, equitably), all parties should come to the bargaining table with the optimum level of information—each party should be able at least to commence the bargaining process with an *ex ante* equality of opportunity to get the best deal. Of course, in practice it is highly unlikely that this will occur, or that there will ever occur an *ex post* equality of outcomes to the satisfaction of all parties.

Smillie (2000, p. 109) briefly considers economic analysis of contract law and concludes that none of the traditionally accepted economic standards of efficiency can provide a clear answer for determining the particular basis that concrete rules for breach of contract should take. Referring to the concept of Pareto efficiency (which says that an action is Pareto-efficient if by doing it, no one is worse off compared with the original situation, and at least one person is better off in the new state), he argues that 'it does convey a valuable insight. It suggests that private exchanges tend to produce economically efficient outcomes and should, therefore, be encouraged.' In saying this, he offers a caution by noting 'Polinsky frankly concedes that there does not exist a breach of contract remedy that is efficient with respect to every consideration: A Mitchell Polinsky, *An Introduction to Law and Economics*, Little, Brown & Co, Boston, 1983, p. 63.'

There is no shortage of economic models to support almost any legal rule in theory. The problem, in practice, is that the assumptions underlying these models may not properly account for the real-world conditions under which the legal rules will have to operate. The economic logic underlying the theory of efficient breach of contract is impeccable. But in practice the information, transaction and bargaining costs inherent in its actual application make its use as a means of maximizing social wealth questionable. Accordingly, disgorgement of profits earned from breach of contract may represent just an additional cost to be factored into a party's calculations before it decides whether to enter into a contract for which there exists some finite probability that it may seek to breach at some future time. The threat of disgorgement may deter some socially efficient behaviour. But at the same time it may produce a more careful evaluation of the desirability of entering into a contract, and of the terms of the contract. In other words, it may produce greater efficiency in the negotiation and writing of contracts. It is simply not possible, in a world of imperfect information, to conclude with any certainty that disgorgement of profits will be socially inefficient.

## THE GENERAL RULE APPLIED

The backdrop to the decision in *A-G v Blake*, as illustrated through the cases, indicates how the courts have dealt with what can be described as the general rule regarding restitutionary damages.

### *United Kingdom*

English cases prior to *A-G v Blake* show that the courts did not accept an extension of the concept of restitutionary damages into contract. Where damages which have taken account of gains have been awarded, this has been regarded as confined to its own particular facts.

In *Wrotham Park Estate Co. Ltd v Parkside Homes Ltd* [1974] 1 WLR 798 houses were built on land burdened with a restrictive covenant. In breach of the covenant, a developer built a number of houses. The plaintiffs sought a mandatory injunction requiring demolition of the houses. The new houses did not diminish the value of the land. A mandatory injunction was refused. Brightman J assessed damages at 5 per cent of the developer's anticipated profits, this being the amount of money which could reasonably have been demanded for a relaxation of the covenant.

In *Tito v Waddell (No 2)* [1977] Ch. 106 the plaintiffs owned plots of land on Ocean Island (south of the Equator in the Western Pacific Ocean) and the defendants acquired licences to mine for phosphate and undertook by way of covenant to replant the area once mined. This covenant was breached. Evidence was brought which indicated that replanting would have been uneconomic for the defendant as it involved the construction of eighty miles of roadway and importing soil from Australia. The court awarded damages based on the diminution in the value of the mined land as a consequence of the breach but refused to take into account the gain to the defendant from the breach.

Megarry V-C distinguished *Wrotham Park Estate* (at p. 335) on the ground that if 'the plaintiff has the right to prevent some act being done without his consent, and the defendant does the act without seeking that consent, the plaintiff has suffered a loss in that the defendant has taken without paying for it something for which the plaintiff could have required payment, namely, the right to do the act'. *Wrotham Park* was concerned with invading property rights of another without consent and in his view it was a long way away from the situation in *Tito*, where the issue was one of breach of contract to replant land.

*Surrey County Council and Another v Bredero Homes Ltd* [1993] 1 WLR 1361 further illustrates the English courts' insistence on the contractual need to prove loss. Here the plaintiffs sold the defendant a development site subject to the defendant obtaining planning permission for the development in accordance with the council's development brief and the scheme for the development of the site.

The defendant covenanted with each plaintiff council that it would carry out the development of the housing estate in accordance with the terms of the planning permission and the approved scheme which had been granted by the Mole Valley District Council. The defendant obtained a fresh planning permission from the Mole Valley District Council which enabled it to build more houses on the site and it completed the extra houses without obtaining any modification of the development covenants. The plaintiffs were aware of the development but they never sought an injunction to restrain the defendant. Instead they brought proceedings against the defendant for damages for breach of the covenants equal to the payment that the defendant should have paid them for contractual permission by way of relaxation of the covenants to build the seventy-seven houses rather than the original seventy-two. The Court of Appeal held that since the councils had not suffered any loss, it followed that the damages recoverable had to be nominal. Steyn LJ stated (p. 1369): 'The object of the award in the *Wrotham Park* case was not to compensate the plaintiff for financial injury, but to deprive the defendants of an unjustly acquired gain'. He could not see any merit in restricting restitutionary relief to cases where there would be available an equitable remedy of specific performance or injunction. In his view there were policy reasons (at p. 1370):

> The introduction of restitutionary remedies to deprive cynical contract breakers of the fruits of their breaches of contract will lead to greater uncertainty in the assessment of damages in commercial and consumer disputes. It is of paramount importance that the way in which disputes are likely to be resolved by the courts must be readily predictable . . . In any event such a widespread availability of restitutionary remedies will have a tendency to discourage economic activity in relevant situations. In a range of cases such liability would fall on underwriters who have insured relevant liability risks. Insurance premiums would have to go up.

*Jaggard v Sawyer* [1995] 1 WLR 269 was concerned with breach of a restrictive covenant. The Court declined to award an injunction but awarded compensatory damages. Sir Thomas Bingham MR (pp. 281–2) discussed Brightman J's decision in *Wrotham Park*. 'He paid attention to the profits earned by the defendants, as it seems to me, not in order to strip the defendants of their unjust gains, but because of the obvious relationship between the profits earned by the defendants and the sum which the defendants would reasonably have been willing to pay to secure release from the covenant.'

*Australia*

The Australian courts generally have refused to allow restitutionary damages in contract law. In *Cell Tech Communications Pty Ltd v Nokia Mobile Phones (UK) Ltd* 136 ALR 733 Lindgren J followed *Surrey County Council and another v Bredero Homes Ltd* [1993] 1 WLR 1361. Support for an account of profits can be found in the following dicta of Deane J's dissenting judgment in *Hospital Products Ltd v United States Surgical Corporation* (1984) 156 CLR 41, 125:

> In all the circumstances, USSC was entitled to a declaration that HPL was liable to account as a constructive trustee for the profits of that Australian business in accordance with the principles under which a constructive trust may be imposed as the appropriate

form of equitable relief in circumstances where a person could not in good conscience retain for himself a benefit, or the proceeds of a benefit, which he has appropriated to himself in breach of his contractual or other legal or equitable obligations to another.

### *New Zealand*

The subject of restitutionary damages has had some judicial comment in the New Zealand High Court where the topic was discussed, but where the judge ensured that the damages that were awarded were couched as compensatory in nature rather than restitutionary.

In *Cash Handling Systems Ltd v Augustus Terrace Developments Ltd* (1996) 3 NZ ConvC 192,398 the plaintiff Cash Handling Systems Ltd (Cash Handling) leased premises from the defendant, Augustus Terrace Developments Ltd ('Augustus') which proposed to redevelop it as residential apartments. Construction began but the parties failed to reach agreement on the surrender of the lease and their relationship deteriorated. The plaintiff applied for and was granted an interlocutory injunction which required the defendant to permit the plaintiff access to the office and restrained the defendant from doing any work on the premises. However, when one of the directors, Mr Oliver, returned to the office the premises had effectively been demolished and framing for one of the apartments (incorporating part of the plaintiff's premises) had been erected. The injunction was discharged by consent upon terms and the plaintiff maintained three causes of action: for wrongful repudiation of contract by Augustus, for breach of the landlord's covenant of quiet enjoyment, and for trespass. The plaintiff claimed special damages, general damages and exemplary damages of $50,000 in respect of the three causes of action.

Elias J outlined the basic damages rules, citing McKay J in *McElroy Milne v Commercial Electronics Ltd* [1993] 1 NZLR 39, p. 49: 'In the case of breach of contract, the remedy of damages for breach of contract is to compensate the plaintiff for damage, loss or injury suffered through the breach of contract'. Her Honour noted that the same general principle applies to the damages recoverable in tort by reason of the conduct which constitutes trespass, and in this case also amounts to repudiation of the contract of lease and breach of the covenant of quiet enjoyment. In such circumstances the lessee could select the most advantageous remedy: *Henderson v Merrett Syndicates Ltd* [1994] 3 All ER 506.

The injunction had been discharged on the undertaking by the defendant to pay damages. Her Honour considered the interference with the property in the lease justified an approach which took into account the benefit obtained by the defendant. The basis upon which such recovery was available was a 'compensation principle of wide application'. Such principle did not depend upon restitutionary remedies. English authority that awarded damages in lieu of an injunction was considered. The Court of Appeal decision *Jaggard v Sawyer* [1995] 1 WLR 269 followed. In that case the court was emphatic that compensatory principles and not restitutionary principles had been applied. Elias J accepted that damages for loss of opportunity to bargain are compensatory not restitutionary: 'whether damages are characterized as compensation for opportunity to bargain for release or, as I prefer, for loss of the right to have the bargain performed, seems to me to express the same point in different words and not to matter in the result. Both compensate for true loss'.

Her Honour did not agree that such damages were limited to cases where damages could be awarded in lieu of an injunction under what is commonly known as Lord Cairns's Act. The equivalent statutory provision in New Zealand is found in s. 16A of the Judicature Act 1908. Watts (1999) considers the damages which he names 'licence fee' damages are best viewed as restitutionary in nature not compensatory. He further distinguishes this type of damages from those in which 'the plaintiff is seeking to strip the defendant's subjective gains solely on the ground that to do so would deter the defendant from committing the relevant wrong'.

Elias J found that the plaintiff was entitled to compensatory damages for the loss of the lease, business interruption and relocation costs. Her Honour acknowledged that exemplary damages in contract will be rare. In this case the defendant had acted deliberately and flagrantly in breach of its obligations under the contract and its behaviour contributed to the escalation of the dispute. In the circumstances a modest award of exemplary damages of $10,000 was held to be appropriate.

It is clear from this summary of cases that there has been no general recognition of restitutionary damages for breach of contract throughout the United Kingdom, Australia and New Zealand. In addition, Mitchell (1999, p. 154) concludes that there is confusion over the relationship between compensatory and restitutionary awards: 'It is not entirely clear precisely when an award is restitutionary and when it is compensatory'.

## THE HOUSE OF LORDS' EXCEPTION TO THE GENERAL RULE

The 'devilishly difficult topic' of a plaintiff who has suffered no loss being awarded damages has been addressed by the House of Lords in *A-G v Blake* [2000] 3 WLR 625 (HL) where the House of Lords has found that such awards may be made in exceptional cases.

In *A-G v Blake*, George Blake was employed as a member of the British security and intelligence services from 1944 to 1961. From 1951 to 1960 he acted as an agent for the Soviet Union and disclosed valuable secret information. In 1961 he was charged under the Official Secrets Act 1911 and was sentenced to forty-two years imprisonment. In 1966 Blake escaped from prison and fled to Berlin. Blake had signed an Official Secrets Act declaration which included a declaration not to divulge any official information gained as a result of his employment, either in the press or book form, but in 1990 his autobiography *No Other Choice* was published by Jonathan Cape. Blake was paid £50,000 on signing the contract in 1989, a further £50,000 on delivering the manuscript and another £50,000 on publication. These proceedings concerned the £90,000 which was still payable. The only civil course of action which the Crown had against Blake was a bare legal cause of action in contract for breach of contract in that he failed to observe the negative undertaking in 1989. However, the Crown did not at the time apply for an injunction. In the Court of Appeal it was suggested that the Crown might have a private law claim to 'restitutionary damages for breach of contract' but the Attorney-General did not pursue the matter. He did, however, advance this argument in the House of Lords.

Lord Nicholls first considered basic principles relating to interference with property rights and noted situations where a strict application of principle would not do justice between the parties. In such situations compensation is measured by a different yardstick. A trespasser may cause no loss. Damage is measured by the benefit received by the trespasser. Likewise where the wrong consists in depositing waste, or using a path across the land or using passages in an underground mine: *Whitlam v Westminster Brymbo Coal Co.* [1892] Ch. 538. The same principle is applied in the wrongful detention of goods.

Under the Lord Cairns's Act if the courts declined to grant an injunction the court could assess damages to include losses likely to follow from the anticipated future continuance of the wrong, as well as losses already suffered. Therefore, the damages may include damages measured by reference to the benefits likely to be obtained in the future by the defendant.

Lord Nicholls considered the remedies available for breaches of contract and outlined the basic principles. An award of damages is not always 'adequate' as a remedy for breach of contract. Specific remedies are discretionary and may be declined, as was the case in *Wrotham Park Estate Co. Ltd v Parkside Homes Ltd* [1974] 1 WLR 798 discussed above.

In *A-G v Blake*, however, the Crown was seeking to go further, as the claim was to all profits which the publisher had not yet paid Blake. Lord Nicholls (p. 637) preferred the approach in *Wrotham Park* to that in the later inconsistent decision *Surrey County Council Bredero Homes Ltd* [1993] 1 WLR 1361. He stated 'The *Wrotham Park* case, therefore, still shines rather as a solitary beacon, showing that in contract as well as tort damages are not always narrowly confined to recoupment of financial loss. In a suitable case damages for breach of contract may be measured by the benefit gained by the wrongdoer from the breach.'

Was an account of profits appropriate? Lord Nicholls reviewed some cases where courts have made orders having the same effect as an order for an account of profits under a different label. His Lordship concluded (p. 638) that there was 'no reason, *in principle*, why the court must in all the circumstances rule out an account of profits as a remedy for breach of contract.' In reaching his conclusion Lord Nicholls used jurisdictional arguments. Damages are not always a sufficient remedy for breach of contract. 'This is the foundation of the court's jurisdiction to grant the remedies of specific performance and injunction' (pp. 638–9). The injured party is sometimes given a choice of either compensatory damages or an account of profits. Such an example is breach of confidence. He rejected (p. 639) the main argument that the circumstances where this remedy may be granted will be uncertain and will have an unsettling effect on commercial contracts: 'I see no reason why, *in practice*, the availability of the remedy of an account of profits need disturb settled expectations in the commercial or consumer world'. His Lordship emphasized (at p. 639) that an account of profits will be appropriate only in exceptional circumstances:

> Normally the remedies of damages, specific performance and injunction, coupled with the characterization of some contractual obligations as fiduciary, will provide an adequate response to a breach of contract. It will be only in exceptional cases, where those remedies are inadequate, that any question of accounting for profits will arise. No fixed rules can be prescribed. The court will have regard to all the circumstances, including the subject matter of the contract, the purpose of the contractual provision which has been breached, the circumstances in which the breach occurred, the consequences of the breach and the circumstances in which relief is being sought. A useful general guide, although not exhaustive, is whether the plaintiff had a legitimate interest in preventing the defendant's profit-making activity and, hence, in depriving him of his profit.

In the Court of Appeal, Lord Woolf MR had suggested two situations in which justice requires the award of restitutionary damages where compensatory damages would be inadequate. Namely, cases of 'skimped' performance, where the defendant fails to provide the full extent of services he has contracted to provide, and where the defendant has obtained his profit by doing the very thing he contracted not to do. However, neither of these was of assistance in defining the boundaries of an account of profits. The three facts which were suggested as not constituting sufficient ground for an award of restitutionary damages were also not by themselves good reasons for ordering an account of profits, namely:

> the fact that the breach was cynical and deliberate; the fact that the breach enabled the defendant to enter into a more profitable contract elsewhere; and the fact that by entering into a new and more profitable contract the defendant put it out of his power to perform his contract with the plaintiff. I agree that none of these facts would be, by itself, a good reason for ordering an account of profits. (per Lord Nicholls p. 640)

The appropriate form of order was a declaration that the Attorney-General was entitled to be paid a sum equal to whatever amount was due and owing to Blake from Jonathan Cape under the publishing agreement of 4 May 1989.

Lords Goff, Browne, Wilkinson and Steyn agreed with Lord Nicholls' judgment. Lord Steyn added further reasons for dismissing the appeal. He acknowledged that the terminology is less important than the substance. His Lordship was not willing to endorse the broad observations of the Court of Appeal (p. 645): 'Exceptions to the general principle that there is no remedy for disgorgement of profits against a contract breaker are best hammered out on the anvil of concrete cases'. Lord Steyn gave consideration to the fact that Blake was in a very similar position to a fiduciary and that the enduring strength of the common law is that it has been developed on a case-by-case basis. He stressed (p. 646) that for judges 'the attainment of practical justice was a major objective of their work'. Lord Hobhouse dissented, outlining two primary difficulties. The claim related to past criminal conduct. It was not a commercial claim in support of any commercial interest. Blake had made a financial gain but he had not done so at the expense of the Crown or by making use of any property or commercial interest of the Crown. Second, while the majority accepted the term 'restitutionary damages' was unsatisfactory, it did not fully examine why this is so. By 1989, Blake's undertaking had no remaining value to the Crown.

In relation to covenants in relation to land and covenants not to build, Lord Hobhouse found (p. 652):

> What the plaintiff has lost is the sum which he could have exacted from the defendant as the price of his consent to the development. This is an example of compensatory damages. They are damages for breach. They do not involve any concept of restitution and so to describe them is an error. The error comes about because of the assumption that the only loss which the plaintiff can have suffered is a reduction in the value of the dominant tenement.

It was for this reason that Lord Hobhouse agreed with Lord Nicholls that the *Wrotham Park* decision was to be preferred to that in *Surrey CC*, but he noted that the order proposed by the majority went further as it awarded the Crown damages which equalled the whole amount owed by Jonathan Cape to Blake: 'that is a remedy based on proprietary principles when the necessary proprietary rights are absent'.

His Lordship did not agree that there was a need to extend the boundaries of remedies for breach of contract. In the present case the Crown should not recover damages, the reason being the exceptional public law nature of the undertaking which Blake gave. If it was still enforceable it would have supported damages on the 'compulsory purchase' basis. The examples which Lord Nicholls had given were in Lord Hobhouse's view examples of compensatory damages.

Lord Hobhouse concluded with a warning (p. 653):

> I must also sound a further note of warning that if some more extensive principle of awarding non-compensatory damages for breach of contract is to be introduced into our commercial law the consequences will be very far reaching and disruptive. I do not believe that such is the intention of your Lordships but if others are tempted to try to extend the decision of the present exceptional case to commercial situations so as to introduce restitutionary rights beyond those presently recognized by the law of restitution, such a step will require very careful consideration before it is acceded to.

## APPLICATION

The undertaking in Blake's case, 'if not a fiduciary obligation, was closely akin to a fiduciary obligation, where an account of profits is a standard remedy in the event of a breach' (per Lord Nicholls at p. 641). Maxton (2000, p. 361) considers a key question that arises is whether *Blake* 'extends beyond obligations closely akin to fiduciary obligations to contractual obligations more generally'. The remedy is of an inherently punitive nature and presumably will be a remedy rarely used. One way of restricting it is where the relationship between the parties is akin to a fiduciary relationship. However, this seems an unnecessary limitation as equity's remedy of account of profit has been available in tort actions without a fiduciary relationship. Likewise, to obtain damages in lieu of an injunction under s. 2 Chancery Amendment Act 1858, commonly known as the Lord Cairns's Act, it has not been necessary in the context of breach of contract to show a fiduciary relationship.

Lord Nicholls emphasized that in the context of breach of contract an account of profits will be appropriate only in exceptional circumstances and stated (p. 639): 'A useful general guide, although not exhaustive, is whether the plaintiff had a legitimate interest in preventing the defendant's profit-making activity and, hence, in depriving him of his profit'. If the information Blake had disclosed had still been confidential, an account of profits would have been ordered. In the case of the intelligence services there were good grounds for imposing an absolute rule against disclosure.

In New Zealand, in *Joblin Insurance Brokers Ltd v ME Joblin Insurances Ltd* [2001] 1 NZLR 753 at p. 759, Hammond J reiterated the inherent flexibility of judicial remedies[6]:

> [T]here is no reason why a plaintiff with multiple causes of action should not succeed on each—provided of course that there is no double recovery. A recent affirmation of this general approach is to be found in the speeches in the House of Lords in Attorney-General v Blake [2000] 4 All ER 385 which now brings English law onto the same footing as that which has long been the position in North America, viz, that in an appropriate case, a plaintiff may have both damages and an account of profits. No fixed rules can be prescribed, and a court has to have regard to all the circumstances, including the subject matter of the contract, the purpose of the contractual provision which was breached, the circumstances in which the breach occurred, the consequences of the breach, and the circumstances in which relief is sought.

The purpose of the contractual provision, which was breached, was relevant in the New Zealand Court of Appeal case, *Attorney-General for England and Wales v R* [2002] NZLR 91. The court considered a confidentiality contract signed by R, a New Zealander, and former member of the United Kingdom Special Forces, which prevented R from publishing a book about events in which he was involved in the Gulf War in 1991. The court delivered separate judgments and were unanimous that if R went ahead and published his book the appellant, the Attorney-General, would be entitled to claim damages and have an account of profits, but that he would not be entitled to injunctive relief preventing publication. McGrath J stated (p. 134): 'It seems clear that the principal purpose for bringing the subject of this appeal has been to demonstrate the legal effectiveness of the confidentiality contracts and the United Kingdom government's determination to enforce them'. The contract specifically indicated that the remedy of an accounting for profits would be an appropriate remedy for breaches of contract by the employee. It provided: '(4) I will assign to MOD all rights accruing to me and arising out of, or in connection with, any disclosure or statement in breach of paragraph (1) in (2) above'.

In Australia, Carr J in *Gull Petroleum (WA) Ltd v Tah Land Pty Ltd* [2001] FCA 1531 warned that 'Attorney-General v Blake was a very special case' with limited application. In a similar vein, Gyles J in *Multigroup Distribution Services Pty Ltd v TNT Australia Pty Ltd* (2001) ATPR 42-842 at p. 42-857 noted that Blake's case marked a radical change in the law of remedies. However, it would not be appropriate remedy 'where the object is compensation for loss or damage'. In that case, application was made to determine whether an account of profits remedy was available under the Trade Practices Act 1974 (Cth).

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[6] See subsequent criticism by D. W. McLauchlan, 'Damages for Misrepresentation Under the Fair Trading Act: The Aftermath of Cox & Coxon,' 8 *NZBLQ* 15, 2000, at pp. 23–4.

Another issue, which could restrict the application of an account of profits, is the defence of a change of position. The House of Lords in *Lipkin Gorman (a firm) v Karpnale Ltd* [1991] 2 AC 548, 579 held that 'where an innocent defendant's position is so changed that he will suffer an injustice if called upon to repay or repay in full, the injustice of requiring him so to repay outweighs the injustice of denying the plaintiff's restitution'. The defence is specific to the law of restitution and is part of the law of Australia and New Zealand.

## CONCLUSION

The House of Lords' approach in *A-G v Blake* breaks new ground in permitting a discretion to order an account of profits. The discretion formulated by the House of Lords is widely expressed as being the appropriate remedy in 'exceptional cases' ([2000] 3 WLR 625, p. 638) and is regarded as usually being relevant when existing remedies (including equitable remedies) would be inadequate. This wide discretion was not limited ('[n]o fixed rules can be prescribed' [p. 369]), and the House of Lords indicated that courts should consider all the circumstances surrounding the case, including the subject matter, the purpose of the breached provision, the circumstances and the consequences of the breach. The court detailed occasions when the remedy might be available, without placing any fetter on the discretion, and indicated that it would be an appropriate remedy in instances where the plaintiff had a 'legitimate interest' in preventing the defendant from profiting from the breach. Effectively, this was new law made to fit Blake's case.

New Zealand and Australian courts are likely to heed the warning of the dissenting judge in *A-G v Blake*, Lord Hobhouse, who considered that the introduction of restitutionary damages for breach of contract into commercial situations would have 'far-reaching and disruptive' consequences. Lord Hobhouse sounded the warning that the decision in *A-G v Blake* may have introduced an element of 'bad law'—introduced as an intuitive response to achieve justice when faced with the preposterous concept that a traitor was about to profit from his criminal actions.

It could be argued that too wide a concept of an account of profits would be a disincentive to efficient breach of contract, but the only reference in the case that could be construed in this manner is that of Lord Nicholls, where he considers that the fact that the breach enabled the defendant to enter into a more profitable contract elsewhere is not good reason for ordering an account of profits. Rickett (2001, p. 390) commenting on the absence of attention from their Lordships on the argument of economic efficiency, concludes that it could 'perhaps be interpreted as an authoritative rejection of its relevance, and perhaps even its validity in judicial analysis'. Nevertheless, the economic effect of an account of profits needs to be carefully considered, in terms of the legal and economic expectations it may create for both contractors and contractees, and the impact these expectations may have on the efficiency of the contracting process. McInnes (2001) outlines *A-G v Blake* and fundamental issues that a court in Canada ought to address before deciding whether or not to follow the House of Lords. One of these is the extent to which it is appropriate to take into account the economic argument. He concludes (at p. 92) that while the Canadian courts may reject 'either the basic premise underlying the economic argument (i.e. that legal rules should be formulated so as to maximize wealth) or the application of the argument to the contractual context, they at least should consider the matter before deciding on the availability of gain-based relief'.

The impact of the decision in *A-G v Blake* should be treated with caution. Its influence may well be limited to instances where the plaintiff has an exceptional 'legitimate interest' in preventing the defendant from profiting from the breach. This would accord with the decision in *Blake's* case, as there the interest to be protected was both legitimate and exceptional, being a wide public interest in ensuring confidentiality to secret intelligence organizations. A narrow interpretation and application of the discretion should minimize any undesirable impact on commercial contracts caused by uncertainty about the possible monetary penalty to be awarded for breach of these contracts.

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# Commonwealth Convergence Toward a Narrower Scope of Auditor Liability to Third Parties for Negligent Misstatements

There have been fundamental shifts in the legal liabilities of auditors in the twentieth century. The article analyses myriad cases. It reveals that case rulings in the later decades moderated previous decisions that had resulted in an expansion of the scope of auditor liability. It shows that there has been a convergence in approach within Commonwealth nations in respect of auditor liability for negligent misstatements. Numerous factors are identified that explain, first the expansion of auditor liability in the early to middle decades of the twentieth century, and also its subsequent reversal in latter decades. The article concludes by arguing that the current positions not likely to remain. The decisions of the courts are shown to be the products of continual struggle to balance the respective rights and interests of auditors, investors (both current and prospective) and the wider community.

**Key words:** Auditing; Liability; Negligence.

The twentieth century is perhaps best remembered by the public accounting profession for the fundamental shifts in the definition of its legal exposure. After decades of expanding liability, recent changes have signalled a moderation of auditor litigation exposure, beginning in the United Kingdom and extending to other Commonwealth nations, particularly Canada, Australia and New Zealand (Sands, 1992; Porter, 1993; Willekens *et al.*, 1996; Gonzalo, 1997; Pacini *et al.*, 1999b). Although lawsuits against auditors are still prevalent in all four countries, third-party liability is now of far less significance than it was ten years ago, for example, when Gwilliam (1987) identified a trend in judicial reasoning toward expanding auditor liability for negligent misstatements to a larger number of third parties. It appears that the trend has now been reversed, resulting in a more homogeneous and conservative paradigm of auditor liability law.

We begin with a discussion of factors impacting the evolution of the law of auditor liability to third parties for negligence. As with any other area of the law, change does not occur in isolation either from related legal principles or the

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broader world—in this case, the auditing profession. The case will be made here that various political pressures and policy considerations in the relevant jurisdictions account for the current convergence and relatively homogeneous approach to auditor liability law across the Commonwealth countries examined. This discussion will be supported by a presentation of case law in the four countries (with summaries in Table 1 and the Appendix). Our purpose is to provide auditors, accounting educators and other interested parties with current information about legal changes in the U.K., Canada, Australia and New Zealand.

Two further matters should be noted by way of preliminary clarification. First, the omission of any direct discussion of U.S. law here is deliberate. Obviously, U.S. law has affected the evolution of the law in the four Commonwealth nations; the motivation to avoid the enormity of U.S. verdicts and/or settlements is powerful, and in this respect the influence of U.S. law should be noted. However, there are fundamental distinguishing characteristics concerning the legal environments in the U.S. and the Commonwealth countries that would make any attempt at identifying unifying principles problematic.[1] Second, we address 'auditor liability' rather than 'accountant liability'. While courts of law often use these two descriptors interchangeably, the former more accurately describes the concerns of present interest.

## THE SHIFTING IMPACT OF THE LAW ON PUBLIC ACCOUNTING FROM THE MID-1960S UNTIL TODAY

### *Trends Starting in the 1960s and the Forces Behind Them*

In order to understand current legal trends, it is critical to place them in the context of an earlier period when there was an enormous expansion in the definition of auditors' liability. While the increased risk exposure of the period before the 1990s was undoubtedly a function of a range of considerations, two primary factors have generally been identified as being of particular importance: the expectation gap (Porter, 1993) and the insurance hypothesis (Ward, 1999; Pacini, *et al.*, 1999b).

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[1] We do not consider the United States in this analysis for several reasons. Most significantly, there are important differences in the legal environments of the four Commonwealth nations and the U.S. The first difference is that in the United Kingdom, Canada, Australia and New Zealand, third-party actions against auditors are torts and are essentially a matter of common law (Willekens *et al.*, 1996). In the U.S., auditor liability to nonclients may be established by both statutory law (primarily the Securities Act of 1933 [15 USC §77(a) *et seq.*], the Securities Exchange Act of 1934 [15 USC §78(a) *et seq.*], and the Racketeer Influenced and Corrupt Organization Act [RICO; 18 U.S.C. §1961 *et seq.*] and tort claims under the common law (Willekens *et al.*, 1996; Pacini and Sinason, 1998). The second difference is that in the U.K., Canada, Australia and New Zealand the issue of which third persons are owed a duty of care can be decided at the national level. In the U.S., the duty of care issue is decided individually by the fifty different state courts (Brecht, 1989) or state legislatures (in the form of accountant liability statutes; Pacini *et al.*, 1999a). A review and analysis of the rules of law applied by the fifty states may be found in Pacini *et al.*, (2000). Finally, the four Commonwealth nations often rely on cases decided in other Commonwealth courts (Fleming, 1998). American decisions are cited occasionally by Commonwealth courts but do not carry similar weight as another Commonwealth court.

*The Expectation Gap* Concern about the quality of auditors' performance is evidenced in litigation involving claims of substandard audit work (Humphrey *et al.*, 1993). Allegations of substandard audit work can be directly related to the expectation gap. This gap refers to a difference between auditors' understanding of their function and investors', creditors' and other users' expectations of the auditor's role.[2]

The expectation gap has been examined in the academic and practitioner literature in the United Kingdom (Humphrey *et al.*, 1993), Canada (CICA [MacDonald Commission], 1988), Australia (Monroe and Woodliff, 1994), and New Zealand (Porter, 1993). The expectation gap has been the subject of formal investigation by commissions, boards and round tables in two of the four subject countries: the MacDonald Commission in Canada and the Financial Reporting and Audit Expectation Gap Task Force (1996) in Australia. The gap between what auditors deliver and what the public expects them to deliver has become so important that it was a theme of the XVth World Congress of the International Federation of Accountants held in Paris in 1997 (Bellavance, 1998).

The conclusions of each of the public inquiries and the academic observers is that the expectation gap does indeed exist. Financial statement users believe independent auditors have a greater responsibility for detecting and reporting fraud and/or financial misinformation than was being met (Porter, 1993). It is likely that some courts were sensitive to the expectations of plaintiffs during the expansionary period of auditor liability.

*The Insurance Hypothesis* Financial statement users who suffer investment or credit losses because of alleged negligent auditing often seek reimbursement or indemnification from auditors. If attempts to settle loss issues without litigation are unsuccessful, a lawsuit may result. The accounting and legal literature both posit that auditors provide a type of implicit insurance to users and investors (Godsell, 1991; Hill *et al.*, 1993; Ward, 1999). The auditor is considered a potential indemnifier if an investment or credit loss is suffered. In fact, Menon and Williams (1994) and Baber *et al.* (1995) provide empirical support that the legal right to seek indemnification from auditors for losses sustained is assigned a value by investors.

When the investor or creditor suffers a loss, the auditor faces potential legal liability. If found liable, the auditor reimburses the investor or creditor for economic losses suffered. In essence, auditor responsibilities are determined by the judicial system as though it compares the cost to the investor/creditor of additional accountant effort and the benefits derived from the extra auditor effort.

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[2] The expectation gap relates to three troublesome areas: (a) detecting and reporting on fraud; (b) detecting and reporting on illegal client acts; and (c) reporting when there is uncertainty about the ability of an entity to continue as a going concern (Porter, 1993). Different underlying explanations have been offered for the continuing presence of significant expectations problems over a long period of time. For example, a common response of the accounting profession has been to stress the misguided nature of external expectations, arguing that the investing public expects too much and remains largely ignorant as to the precise nature, purpose, and capacities of the audit function (Humphrey *et al.*, 1993). In contrast, it has been argued that the legitimacy of the duties and standards adopted by any self-regulating profession can never be isolated from the expectations of the various interest groups who pay for and rely upon its services (Godsell, 1991).

The benefits consist of the reduction in the investor's expected loss due to unreliable auditor work product (DeJong and Smith, 1984). It is the reduction in the investor's or creditor's expected loss indemnified by the auditor which is part of the insurance hypothesis.

Legal proponents of the auditor-as-insurer argument assert that because accounting firms are well capitalized, they can absorb losses resulting from their own negligence even when the costs cannot be passed along (Jurinski, 1987; Gunz and McCutcheon, 1996). The auditor is deemed to be a 'deep pocket' because the auditing firm often carries malpractice insurance or, in many cases, is the only solvent defendant in a lawsuit.

### *The Impact of Increased Legal Risk Exposure on the Auditing Profession*

Salter and Doupnik (1992) document that the accounting practices of a country are related to that nation's legal system. Auditor judgment is exercised to a much greater extent in common law countries than in civil law countries.[3] Greater use of professional judgment creates more opportunities for that judgment to be challenged by financial statement users in a lawsuit.

Reliable estimates of the value of actual settlements and/or verdicts against public accounting firms are difficult to obtain. However, while claims cannot be equated with successful outcomes of litigation, they do provide one measure of the scope of the liability problem. The large number of claims suggests that, during the decade of the late 1980s and early 1990s, the number, size and scope of claims against accountants has been large in all relevant jurisdictions. In the United Kingdom, the Big Six (then Big Five and now Big Four) accounting firms faced 627 outstanding legal cases claiming damages of £20 billion by mid-1994 (Beckett, 1994). Some recent analysis of major common law countries has shown that twenty-three of the largest claims brought, primarily in the U.K. courts, represented a total exposure for accounting firms of over £9 billion (Lemar, 1999). Despite the recent increased conservatism of judicial decisions (see below), U.K. accountants appear concerned that they could be heading towards an environment as litigious as the U.S. (Peel, 1999). Moreover, a new set of procedural rules for civil actions took effect in England in 1999 that could swing the pendulum more in favour of plaintiffs (Highley, 1999).

By 1994, at least $1.3 billion (Canadian) of unresolved claims were pending against Canadian accountants (Jeffrey, 1994). In Australia, accountants have faced an unprecedented litigation problem (Cooper and Barkoczy, 1994). It is estimated that the total amount of negligence claims that have been brought against Australian accountants accumulated to approximately A$8 billion (Miller, 1999). In New Zealand, the cost of defending legal actions by accounting firms has been recognized as a major business problem (Porfer, 1993; Lepper, 1992).

The magnitude of auditor litigation in the four Commonwealth countries has led to: (a) accounting firms being more aggressive in refusing to render services to high-litigation-risk firms (Jack, 1994; Thompson, 1994; Ward, 1999); (b) increasing audit fees (Huss and Jacobs, 1991; Jones and Raghunandan, 1998; Lemar, 1999); (c) a decrease in the availability and a rise in the cost of professional liability insurance[4] (Johnston, Stokes, and Watts, 1995; Wild, 1999); and (d) an increase in the number of experienced accountants departing the profession (Pheasant, 1993).[5] A study by the International Federation of Accountants suggests that oppressive legal action actually weakens incentives for parties to monitor enterprises under their control, has a limited effect on reducing negligence by auditors, and may lead to increased litigation risk because of the availability of insurance money for claimants (*CMA Magazine*, 1998).

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[3] The degree to which accounting rules are legislated can affect the nature of the accounting system. In code law countries, laws stipulate minimum requirements and accounting rules tend to be highly prescriptive and procedural. In common law countries, laws establish limits beyond which it is illegal to venture and within those limits experimentation is encouraged (Meek and Saudagaran, 1990).

### *Judicial Consideration of Policy Concerns*

Courts do not act in isolation from the policy impact of prior decisions. It is common for cases to be argued not only on the basis of legal principles but also from the standpoint of the economic, political, and/or social consequences of past decisions. Moreover, as will be highlighted below, courts themselves have, in part, justified decisions by consideration of various policy considerations.

The subsequent discussion of the evolution of case law will illustrate how a trend toward expanding the scope of auditor liability to third parties emerged in the U.K., Canada, Australia and New Zealand from the 1960s through the 1980s (Gwilliam, 1987). This expansion moved the scope of duty away from a narrow ambit of liability (the privity and near-privity standards) towards the other end of a continuum where a far greater potential number of third parties can sue the auditor (Brecht, 1989; Pacini *et al.*, 1999b).

The expansion of auditor liability to third parties was part of a larger movement in tort law that can be interpreted alternatively as encouraging risk creators to employ optimal levels of care or shifting allocation of costs to parties better able to bear the losses. Tort law was increasingly viewed as an instrument of social engineering, with expanded liability serving as a powerful means to encourage greater safety, particularly in the area of products liability. As a result, the foreseeability of harm, rather than the nature of the contract, began to define legal duty in many fields of endeavour, including auditing services (Ivankovich, 1991; Siciliano, 1997). The independent audit was no longer seen as the creature of a contract, but rather as a product which, like any other, foreseeably might harm third parties if it was defectively produced (Corbett, 1994; Siciliano, 1997).

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[4] For example, the largest accounting firms in the U.K. are paying as much as 8 per cent of their auditing and accounting fee income on professional liability insurance (Napier, 1998).

[5] A rise in the number of experienced accountants leaving the profession 'is of concern to CPAs and CAs and society, because a sound public accounting profession is essential to a healthy free enterprise system'. In particular, there is a concern that an exodus of experienced personnel from public accounting will harm audit quality (Dalton *et al.*, 1994). Audited financial statements are necessary to gain access to the capital markets of the United Kingdom, Canada, Australia and New Zealand. A decreased availability of quality audit services produces a barrier to the growth of firms going public and to the ultimate expansion of an economy.

Courts predicted numerous benefits from the expansion of auditor liability to third parties. First, by imposing liability on the one responsible for the loss the foreseeability rule would cause auditors to perform more thorough audits.[6] Second, a more expansive liability rule would compensate the innocent third party who had relied on a defective audit (Siciliano, 1988; Tettenborn, 1989; Ivankovich, 1991). Third, expansion of auditor liability is consistent with the moral blame attached to auditor misconduct (Ivankovich, 1991). Fourth, liability expansion would promote efficient loss-spreading (Fleming, 1990; Ivankovich, 1991). However, as the predicted benefits failed to materialize, or the costs associated with these shifts appeared to threaten the viability of the profession, the stage was set for judicial reconsideration (Ivankovich, 1991; Siciliano, 1997).

Reform courts of prior decades failed to distinguish accounting, where the product is information, from manufacturers of goods. While a defective good, such as a chainsaw, may harm one or two users before it exhausts its defectiveness, bad information, such as an audit, can move from user to user at a very low cost (Cherniak and Stevens, 1992; Siciliano, 1997). In *Hedley Byrne*, Lord Pearce captured this unique characteristic of information when he wrote: 'The reason for some divergence between the law of negligence in word and that of negligence in act is clear. Negligence in word creates problems different from those of negligence in act. Words are more volatile than deeds. *They are used without being expended* and take effect in combination with innumerable facts and other words.'[7]

Thus, a negligent audit may cause enormous damage as it is relied on by an indefinite chain of users. This situation gives rise to what Cardozo referred to as liability 'in an indeterminate amount for an indeterminate time to an indeterminate class'. Hence, many courts in the common law countries have circumscribed auditor liability to third parties so that auditors will 'not be liable in circumstances where they are unaware of the use to which their opinions will be put'.[8]

Moreover, the compensation of third parties who have relied on a defective audit often results in a gratuitous guarantee against risk at the auditor's expense. Often plaintiffs (lenders and investors, for example) in auditor liability cases are sophisticated and capable of protecting themselves against risk (Siciliano, 1997).[9] Under a broad liability rule, third parties who previously used a variety of risk assessment techniques before deciding whether to transact started to rely exclusively on the accuracy of audited financial statements to evaluate a company's health (O'Sullivan, 1993). In *Hercules Managements Ltd*, the Supreme Court of Canada highlighted the impracticality of the auditor-as-insurer argument:

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[6] See *Scott Group Ltd v McFarlane* [1978] 1 NZLR 553 and *Hercules Managements Ltd v Ernst & Young* [1997] 2 SCR 165.

[7] [1964] AC 465, 534.

[8] *Raritan River Steel v Cherry*, 367 SE 2d 609 (N.C. 1988).

[9] See *Hercules Managements Ltd v Ernst & Young* [1997] 2 SCR 165, 182, and *Esanda Finance v Peat Marwick Hungerfords* [1997] CLR 241, 284–5.

> Creditors and investors on the other hand are likely to be in a better position than auditors to know the likely extent of their losses... Unlike most plaintiffs in negligence cases, these investors and creditors can take steps to protect themselves against loss. Some creditors and investors will have the staff or means to investigate and verify that part of the audited person's financial affairs that is relevant to the loan or investment ... Investors can spread their risk by diversifying their investments.[10]

Moreover, auditors have at different times found it difficult to spread or socialize risk through the purchase of affordable professional liability insurance.[11] The potential unavailability of liability insurance may also reduce the quality of corporate financial reporting (O'Sullivan, 1993).[12]

Finally, courts increasingly expressed concern that expansive third-party liability would affect the ability of the judicial system itself to deliver service because it would cause an inevitable and serious logjam in the courts. This policy factor was emphasized by the Supreme Court of Canada:

> [N]o examination of the public interest should overlook the effect of an extension of auditor's liability on the administration of the court system... Experience of claims against auditors by public company liquidators over the last thirty years... indicate that almost any claim is likely to take many months to hear... Any extension of auditor's liability... is likely to mean that courts and judges hearing such cases will be tied up for many months.[13]

These same concerns have been echoed in many of the leading cases in the area.

In sum, consequences of the expansion of auditor liability to third parties, labelled by courts as 'policy factors', when distilled to their essence, often provide strong justifications for auditors owing a legal duty to a reduced number of third parties. As Cane (1996) aptly stated in an analysis of *Caparo*: 'whether a duty of care in the making of statements is owed in any particular circumstances depends not on any undertaking or assumption of legal responsibility by the defendant, but on whether the court thinks that, all things considered, a duty ought to be imposed'.

### *The Political Response of the Accounting Profession to Increased Liability*

At the time the accounting profession had reason to believe it was facing a genuine litigation crisis, one of its public responses other than defending itself against claims was to mount a campaign aimed at 'leveling the playing field' upon which liability claims are resolved. These campaigns continue today in all four countries (Green, 1999). We briefly highlight the variety of proposals coming from the profession and the legislative responses to date.

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[10] [1997] 2 SCR 165, 182–7.

[11] In the United Kingdom, below $75 million the Big Five retain the risks themselves as self-insurance using their own captive insurance companies. The effective ceiling on coverage is $340 million (Moizer and Hansford-Smith, 1998). In Australia, the scale of the problem is such that auditors are finding it increasingly difficult to obtain insurance and that where it is available it is extremely expensive (Ward, 1999). This continues in the new millennium.

[12] The unavailability of insurance protection affects the U.K. auditing profession's self-regulation strategy. In order to conform with the Companies Act 1989, auditors must demonstrate an ability to satisfy professional liability claims. Insurers' underwriting techniques impose financial penalties on low-quality auditors. Insurance schemes provide for the withdrawal of practising certificates from those auditors unable to obtain insurance protection. The unavailability of insurance is likely to remove insurers' monitoring of auditor quality which could reduce corporate disclosure quality (O'Sullivan, 1993).

[13] *Hercules Managements Ltd v Ernst & Young* [1997] 2 SCR 165, 174–6.

In the U.K., the accounting profession has lobbied the national government to introduce legislation requiring directors to take out liability insurance so that stakeholders can seek damages from sources other than accountants (Cousins *et al.*, 1999). The Institute of Chartered Accountants in England and Wales has also pushed for (a) 'capping' of auditor liability based upon some multiple of audit fees, and (b) proportionate, rather than joint and several liability (Cousins *et al.*, 1999). The Law Commission studied both issues and initially declined to pursue them. However, capping an auditor's liability has been revived as part of an industry proposal recommending changes to U.K. company law (Peel, 2000).

Since April 2001, U.K. accounting firms have been permitted to operate as limited liability partnerships (LLPs). The LLP is designed to resemble a limited company in that the liability of its individual members will be limited to the amount that each agrees to pay in the event of a firm's insolvency. The cost is that the LLP will have to file audited accounts at Companies House and disclose profits earned. Various creditor protection rules have been extended to LLPs (Davies, 2001).

In Canada, the accounting profession has also been engaged in reform efforts. For example, in March 1995, the Canadian Institute of Chartered Accountants of Alberta issued a discussion paper on auditor liability to seek legislative changes from the provincial government (Green, 1999). In 1998, the Ontario provincial government proclaimed Canada's first LLP law (Westell, 1998). Other Canadian provinces are following this example.

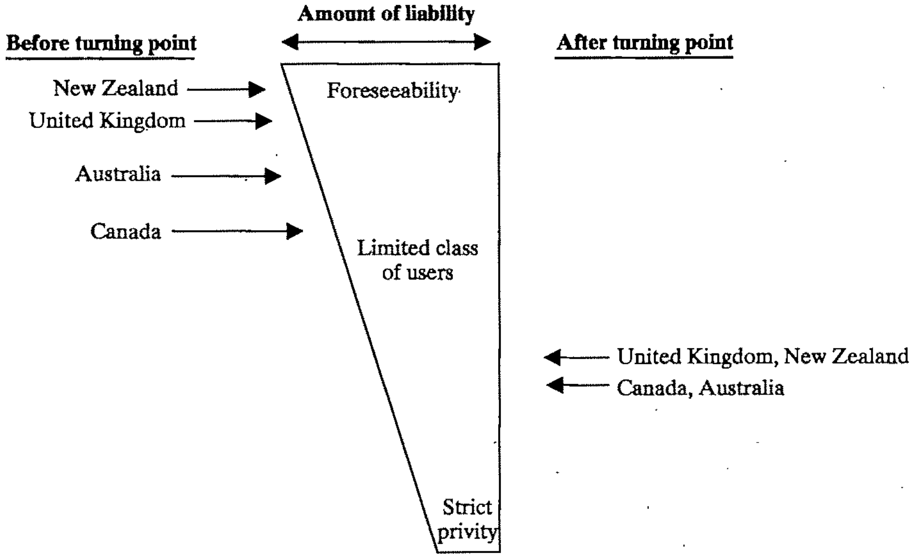
In Australia, the Australian Society of Certified Practising Accountants and the Institute of Chartered Accountants in Australia established a National Joint Limitation of Liability Task Force to work toward enactment of legislation to cap damage awards in negligence actions against auditors (Miller, 1999). Reform efforts have been partially successful. In New South Wales, the state legislature passed the Professional Standards Act, 1994. The act provides for the establishment of authorized schemes, by bodies such as the accountancy profession, which are applicable to the entire membership of an entire occupational association or to a specified membership class (Miller, 1999). Liability is limited by insurance arrangements and/or reference to the amount of business assets and/or a multiple of fees or charges (Miller, 1999). The task force has continued its efforts for damage award limitations at the national level (Miller, 1999). In the early years of the new millennium further tort reforms have been implemented by the New South Wales State legislature.

## THE MOVE TOWARDS A HOMOGENEOUS COMMONWEALTH LAW OF AUDITOR LIABILITY

The concerns expressed in the political and policy debates found their way before courts, and over time influenced judicial decisions so that, in the last decade,

FIGURE 1

LIABILITY CONTINUUM



judicial interpretations in the United Kingdom, Canada, Australia and New Zealand shifted along a continuum anchored by a broad definition of third-party liability on one end and converging toward a narrower scope of auditor liability to third parties for negligence at the other. Beyond the theoretical discussion in specific decisions, a pattern of similarity across the jurisdictions emerges (Mason, 1997). The following examination of the evolution of the law in each of the four subject nations explains how this convergence has occurred.

### *Auditor's Liability Continuum*

We depict the discernible scope of an auditor's duty of care to third parties on a liability continuum presented in Figure 1 and use this device throughout the balance of the paper.

Three key points on the continuum are 'strict privity', 'limited class of users' test' and 'foreseeability'. The requirement of strict privity to establish an auditor's duty to nonclients is the most restrictive standard. Strict privity requires a direct connection or contractual relationship to exist between an auditor and another party for the latter to have the legal right to sue the auditor for negligent misstatements. By definition, under this regime, there can be no liability to nonclients. As noted below, none of the four countries has followed the strict privity standard for the period covered in this article (1964–2000).

The foreseeability standard is the broadest in scope in that it imposes a duty in favour of all users who the auditor knew or reasonably should have known would rely on the auditor's work product. As will be discussed, all four Commonwealth nations appeared to be moving toward such a standard or actually applied the standard up to the late 1980s or into the 1990s when a trend toward a more narrow scope of liability began.

The limited class of users' test is less restrictive than strict privity and represents a middle ground on the continuum. Generally, under the limited class of users' test, the auditor owes a duty when the following conditions adhere: (a) the auditor knew that the work product would be communicated to a known third party or known limited class; (b) the third party suffered damage as a result of relying on the auditor's work product; and (c) the work product was used for the purpose for which it was prepared (Marshall, 1990). We present evidence subsequently that while this was the standard applied in all four nations at one time, the present position of the four countries lies somewhere between the limited class of users' test and strict privity on the continuum.

In the following sections, the evolution of the law in the four countries is examined in terms of the expansionary and post-expansionary periods. Only the key points of the relevant cases are presented in the body of the text. Summaries of the facts of the cases can be found in the Appendix, and of the key legal points made in the cases in Table 1.

The first U.S. cases on auditor liability predate the main initiatives in the four Commonwealth countries. U.S. courts first addressed this subject almost seventy years ago. Early American legal rulings affecting auditor liability—*Ultramares*

TABLE 1

| Case name | Key elements of decision |
|---|---|
| Panel A: United Kingdom | |
| *Hedley Byrne & Co v Heller & Partners* [1964] | Persons uttering statements owe a duty to any third person with whom a 'special relationship' existed. A 'special relationship' includes more than a fiduciary or contractual relationship, but no criteria were specified for deciding when a 'special relationship' arises. A 'special relationship' can arise because of a voluntary assumption of responsibility by the defendant. (House of Lords) |
| *Anns v London Borough of Merton* [1978] | The basis of the scope of duty moved from 'voluntary assumption of responsibility' to 'foreseeability' using a two-pronged test. The first prong asks whether the defendant's carelessness may be likely to injure the suing party. An affirmative response invokes a duty of care. The second prong examines any considerations that could reduce or eliminate any duty owed. This case shifts the balance toward liability. (House of Lords) |
| *JEB Fasteners, Ltd v Marks Bloom & Co* [1981] | The test for establishing a duty of care is whether the auditors knew or reasonably should have known that a person might rely on the audited financial statements for making a decision. (Queen's Bench Division) |

TABLE 1

CONTINUED

| Case name | Key elements of decision |
|---|---|
| *Twomax Ltd v Dickson, McFarlane & Robinson* [1982] | Proximity was found to exist, thus giving rise to a duty of care, when the auditors knew or should have known that the potential investors might rely on the audited financial statements. |
| *Caparo Industries PLC v Dickman* [1990] | An auditor of a public company, in the absence of special circumstances, owes no duty of care to an outside investor or an existing shareholder who buys stock in reliance on a statutory audit. A three-pronged test for a duty of care is applied: (a) foreseeability; (b) proximity; (c) it must be just and reasonable on a policy basis to impose a duty. Auditor liability for negligent misstatements is confined to cases in which it can be established that the auditor knew his or her work product would be communicated to a non-client, either individually or as a member of a limited class, and the third party relied on the work product in connection with a particular transaction. This case severely restricts the application of liability. (House of Lords) |
| *James McNaughton Papers Group, Ltd v Hicks Anderson and Co* [1990] | Applying *Caparo*, the important factors to consider are the purpose for which the information was prepared and communicated; the relationship between the accountant, client, and third party; the size of the third party's class; and the extent of the third party's reliance. (Court of Appeal) |
| *Galoo, Ltd v Bright Grahame Murray* [1995] | Applied *Caparo*. (Court of Appeal). |
| *Law Society v KPMG Peat Marwick* [2000] | Applied *Caparo*. |
| Panel B: Canada | |
| *Haig v Bamford* [1977] | The court adopted the 'limited class of users' test for a duty of care but did not require the defendant auditor to have knowledge of the specific third-party user. The court left open the possibility of application of the foreseeability rule. (Supreme Court of Canada) |
| *Surrey Credit Union v Wilson* [1990] | The court found a duty of care was owed by the auditor despite limited evidence of reliance and a large class of unidentified users who could have obtained prospectus information. (B.C. Supreme Court) |
| *Kripps v Touche Ross & Co* [1994] | The court took a broad view of the purpose of the audited statements and the boundaries of the class of intended users in the context of a prospectus. (B.C. Court of Appeals) |
| *Hercules Management Ltd v Ernst & Young* [1997] | The court adopted the two-pronged *Anns/Kamloops* test. The first prong requires that the accountant: (a) should reasonably foresee that a third party will rely on the accountant's work product; and (b) the third party's reliance is reasonable. The second prong examines policy factors that can limit or eliminate any duty established. Concerns over indeterminate liability will negate any duty owed in most cases. Some cases may arise where policy considerations are not relevant. This case severely restricts the application of liability. (Supreme Court of Canada) |

TABLE 1

CONTINUED

| | |
|---|---|
| Panel C: Australia | |
| *Mutual Life & Citizens Assurance Co Ltd v Evatt* [1968] | The court ruled that a person owes a duty of care to another when the one providing the information realizes, or ought to realize, that he or she is being trusted to provide information that will be acted upon by the third party. The potential scope of liability is narrow because the case focuses on a direct request from a third party for information. (High Court of Australia) |
| *BT Australia Ltd v Raine and Horne Party Ltd* [1983] | This case also did not involve accountants. Duty of care was treated as an extension of *Hedley Byrne*. The decision provides support for the proposition that a duty is owed to unidentified members of a known and limited class. The information provider, however, need not have an intent to induce reliance for a duty to arise. (Supreme Court of New South Wales) |
| *Columbia Coffee and Tea Party Ltd v Churchill* [1992] | The court applied a proposition in *Evatt* that a duty of care is created where an auditor knew or ought to have known that a nonclient would rely on the auditor's report. (Supreme Court of New South Wales) |
| *R. Lowe Lippman Figdor & Franck v AGC (Advances) Ltd* [1992] | The court held that the auditor must have an intent to induce reliance by a party or a limited class for a duty of care to arise unless other circumstances are sufficient to impose such a duty. (Supreme Court of Victoria) |
| *Esanda Finance Corp Lts v Peat Marwick Hungerfords* [1997] | The court endorsed the reasoning applied in *R. Lowe Lippman Figdor*. It is necessary to have both foreseeability of harm plus a relationship of proximity for a duty of care to arise. A duty of care is difficult to establish unless the auditor intends to induce reliance on his work product by a nonclient or a limited class. Other factors, besides intent to induce reliance, may establish proximity. The High Court outlined numerous policy factors that should be weighed in deciding whether a duty of care arises. This case severely restricts the application of third-party liability. (High Court of Australia) |
| *Perre v Apand* [1999] | The plaintiff must demonstrate vulnerability rather than show proximity and reliance for a duty of care to arise. (High Court of Australia) |
| Panel D: New Zealand | |
| *Scott Group, Ltd v Macfarlane* [1978] | The court held that a duty of care arises when it is reasonably foreseeable that someone other than the client might rely on the auditor's work product. Foreseeability was deemed the relevant test for the creation of a duty (or relationship of proximity). The auditor does not need to be aware of the third party's actual reliance. The court applied the first prong of the *Anns* two-pronged test as the legal test for determining the existence of a duty of care. (New Zealand Court of Appeal) |
| *Boyd Knight v Purdue* [1999] | The court impliedly overruled *Scott Group*. Auditors owe no duty to present or future creditors or to those who may be contemplating investing or further investing in a firm's debt or equity securities. Auditors owe a duty only to a third person to whom they, themselves, show the accounts, or to whom they know their client is going to show the accounts. Any duty applies only to those transactions for which the auditors know their accounts were required. A suing party must prove actual, specific reliance on the auditor's work product. *Boyd Knight* cites *Caparo*, *Hercules Management* and *Esanda Finance* with approval. This case severely restricts third-party liability. (New Zealand Court of Appeal) |

*Corp. v Touche*[14] and *Glanzer v Shepard*[15] in particular—were indirectly influential in the four subject nations until the early 1960s (Mason 1997; Blackier and Paskell-Mede, 1999). Judge Cardozo's opinions in both cases focused on restricting liability to the intended, not actual, user or users of the work product of the one hired to render a service. They remain widely quoted in most common law jurisdictions today.

### *Evolution of Auditors' Liability in the Four Commonwealth Countries*

*U.K. Third-Party Liability Expansion Period* Lord Justice Denning, in a dissenting opinion in *Candler v Crane Christmas & Co.*, a case which upheld the doctrine of privity of contract,[16] laid the foundation in British jurisprudence for the tort of negligent misrepresentation (or recovery for economic loss rather than injury to person or property). In his dissenting judgment, Lord Denning wrote that 'those persons . . . whose profession and occupation it is to examine books, accounts . . . and to make reports on which other people—other than their clients—rely in the ordinary course of business' (2 KB 164 at pp. 179–80) owe a duty of care to those third parties. More specifically, Lord Denning stated that a duty is owed, in the case of accountants, to any third person to whom accountants show their work product or to a third party to whom the accountants know their client is going to show the work product, so as to induce the third party to invest money or take some other action.

Following the reasoning of Cardozo, Lord Denning expressed concern that accountants should not be exposed to the spectre of unlimited liability. The means by which Lord Denning restricted potential third-party liability was the introduction of a 'purpose' element into the legal analysis (e.g., so as to induce another to invest money). His reasoning went a step beyond that of Cardozo by considering the purpose rather than just delineating the actual versus intended users of the auditor's work product (Blackier and Paskell-Mede, 1999).

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[14] 174 NE 441 (N.Y. 1931). The New York Court of Appeals denied plaintiff Ultramares' negligence claim but fashioned an exception to strict privity that has become known as the primary benefit rule. The court concluded that although the auditor (Touche Niven & Co.) knew the audited balance sheet would be shown to various unidentified creditors and stockholders, Touche had not been hired by its client with the knowledge that Ultramares (the plaintiff) was an intended third-party beneficiary of Touche's work. In this case, the auditor's service was primarily for the benefit of the client and only collaterally for the use of third parties (Gormley, 1984). The Court of Appeals wished to avoid 'liability in an indeterminate amount for an indeterminate time to an indeterminate class'.

[15] 135 NE 275 (N.Y. 1922). The decision in *Glanzer* influenced the outcome in *Ultramares*. In *Glanzer*, the Court of Appeals held that a public weigher, hired by a seller of beans, was liable to a third party who purchased beans from the bean vendor. The third party was overcharged for the beans because the weigher negligently overstated the weight of the beans. The public weigher had been hired by the seller to provide a weight certificate directly to the bean purchaser. In distinguishing *Glanzer* from *Ultramares*, Judge Cardozo noted that the service rendered by the public weigher was primarily for the benefit of a third person while in *Ultramares*, the auditor's service was primarily for the benefit of the client and only collaterally for the use of third persons.

[16] [1951] 1 All ER 426.

It was in *Hedley Byrne & Co. v Heller & Partners*,[17] a case not involving accountants, that the House of Lords (the highest court of law in the U.K.) adopted Lord Denning's argument in establishing that a third party who had relied to his detriment on a negligent misstatement could sue despite the absence of privity of contract (Napier, 1998). The House of Lords ruled that persons uttering statements owed a duty to any third person with whom a 'special relationship' exists. Although the defendant escaped liability due to a disclaimer, the court held that a 'special relationship' had existed because of a 'voluntary assumption of responsibility' by the defendant to the plaintiff (Morris, 1991). A 'special relationship' includes more than a fiduciary or contractual relationship (James, 1989), but the law lords failed to specify criteria for deciding when a 'special relationship' arises and when a duty of care comes into existence (Ivankovich, 1991).

*Hedley Byrne* has been applied by the U.K. judiciary in a broad fashion such that negligent misstatements became actionable in many different situations (Mullender, 2000).[18] Thus, it is no surprise that considerable speculation existed concerning *Hedley Byrne* and whether it would represent the first significant inroad into the general denial of the ability of nonclients to sue auditors for negligence (Chapman, 1992). Subsequent case law has shown that such speculation was, in some cases, well-founded.

The general trend in the law of negligent misstatement after *Hedley Byrne* was toward expanding the scope of duty to more third parties (Ivankovich, 1991). The scope of duty or 'special relationship' moved from 'voluntary assumption' of responsibility by the auditor to the third party's 'reasonable reliance' to 'foreseeability' (James, 1990). The application of the foreseeability concept, albeit one with something of a caveat (the second part of the test), was first introduced in *Anns v London Borough of Merton*.[19] Instead of applying the *Hedley Byrne* analysis to determine whether a duty of care existed, Lord Wilberforce adapted the negligence test from *Donoghue v Stevenson*[20] in crafting a two-pronged test for negligence cases (Gosnell, 2000).

The first prong considers whether there is a sufficient relationship of proximity between the suing party and the defendant to give rise to a duty of care. The second examines any consideration that could reduce or eliminate any duty owed.

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[17] [1964] AC 465. Traditionally, U.K. courts (before *Hedley Byrne)* did not allow recovery for pure economic losses. Policy considerations were the rationale behind this restrictive approach. Economic losses frequently arise in a commercial context where as a result of the inherent nature of market activity, market forces direct financial gains and losses, often in the course of deliberate commercial activities or superior competition. Accordingly, there is no social cost to the community, nor any social value in compensating a person's monetary losses, particularly where the claimant has chosen the terms of economic risk (Mason, 1997).

[18] Although technically obiter dicta, the extensive comments on negligent misstatements have been applied with the force of law by many U.K. courts in a broad fashion over the years (Mullender, 2000).

[19] [1978] AC 728.

[20] [1932] AC 562.

The *Anns* case dispensed with the need for the special relationship analysis of *Hedley Byrne* as a precondition for finding a duty of care for pure economic loss (e.g., an auditor's negligent misstatement). The *Anns* test moved toward a recognition of pure economic losses as being subject to the same test as applied to cases of physical damage or personal injury (Gosnell, 2000). *Anns* is expansive because it shifted the balance toward liability unless negated by policy considerations rather than requiring policy to justify an expansion of liability (Ivankovich, 1991; Morris, 1991). The practical effect of *Anns* was to expand the limits of the concept of foreseeability, leaving any limitation on liability to the vagaries of *ad hoc* policy assessments (Ivankovich, 1991).

The *Anns* test was applied in the context of auditor's liability to nonclients in *JEB Fasteners, Ltd v Marks Bloom & Co.*,[21] a single-judge decision. Strictly on the duty of care issue, the Queen's Bench Division held that the auditors owed JEB Fasteners a duty of care.[22] Judge Woolf relied on both the *Anns* case and *Scott Group, Ltd v McFarlane*[23] in reaching the conclusion that the duty could be derived from foreseeability alone. *JEB Fasteners* clearly increased the number of third parties who have a legal right to sue auditors for negligence (Davies, 1991; Gwilliam, 1987) even though the plaintiffs ultimately lost since it was held the negligence did not cause the loss (the issues of causation and reliance were not often the determining factors in auditor negligence litigation but are frequently the most difficult to prove [Gunz and McCutcheon, 1996]).

The *Anns* case was also applied in the Outer House of Session in Scotland in *Twomax Ltd v Dickson, McFarlane & Robinson*.[24] The court dealt with three separate legal claims. As in *JEB Fasteners*, the defendant auditors were found to owe a duty of care to the plaintiff investors. Moreover, the court held the auditor liable for damages because the plaintiff's loss stemmed from reliance on the audited financial statements. Lord Stewart followed the reasoning in *Anns*, *Scott Group* and *JEB Fasteners* in deciding that foreseeability and proximity are synonymous.

Although *JEB Fasteners* and *Twomax* are lower court decisions, neither of which was appealed on the scope of duty of care issue *per se*, they reflect an expansionist approach in the British legal paradigm involving third-party liability for negligence. These two cases involved specific application to auditors of the *Anns* attempt to articulate a single general principle applicable to negligence cases regardless of whether they involved property damage, physical injury or pure economic loss (Morris, 1991; Gosnell, 2000). Prior to the third-party liability turning point, discussed subsequently, the U.K. would be represented on Figure 1 between the limited class of users' test and the foreseeability rule. However, within a short time, the House of Lords embarked upon a process of retrenchment.

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[21] [1981] 3 All ER 289, aff'd, [1983] 1 All ER 583 (CA).

[22] Although the Queen's Bench Division held that the plaintiffs were deemed to be within the ambit of the accountant's duty of care (the focus of this paper), there was insufficient reliance to satisfy the duty test (Martyn, 1990). Moreover, the decision of the Queen's Bench Division with regard to insufficient reliance was upheld by the Court of Appeal.

[23] [1978] 1 NZLR 553.

[24] [1982] SC 113.

*U.K. Third-Party Liability Turning Point* The rejection of the two-stage test of *Anns* and the start of a new phase in the U.K., based on the incremental approach, began with the House of Lords' decision in *Caparo Industries PLC v Dickman* (Stanton, 1997).[25] In a unanimous decision, the House of Lords dismissed the negligence claim. Specifically, the court held that an auditor of a public company, in the absence of special circumstances (e.g., an audit report commissioned on behalf of a plaintiff for a particular purpose), owes no duty of care to an outside investor or an existing shareholder who buys shares in reliance on a statutory audit (Nicholson, 1991).

In reaching their decision, the House of Lords retreated from the *Anns* approach and sought to apply an incremental or precedent-based approach.[26] The House of Lords struggled to find an appropriate precedent as *JEB Fasteners* and *Twomax* were tainted by *Anns* and *Candler* had been effectively overturned by *Hedley Byrne*. Consequently, the House of Lords turned to Denning's dissenting opinion in *Candler* as the source of their precedent (Gwilliam, 1991, 1997). From Denning's dissent, the House of Lords underscored the importance of an auditor's representation being used for the purpose for which it was intended if a duty of care is to arise (Gwilliam, 1997).

Although technically approved by only three justices, the *Caparo* court fashioned a three-pronged test for determining whether liability in negligence to a third party is to be ascribed (which was endorsed in subsequent House of Lords decisions).[27] First, foreseeability must exist. Second, proximity must be present between the suing party and the defendant. Third, it must be just and reasonable on a policy basis to impose a duty of care. Whatever possibilities were created by the language of the test, the signs were in favour of retreat. The shift away from public policy factors (barely mentioned in *Caparo*) to a consideration of what is 'just and reasonable' to impose a duty of care signalled more caution as to the legislative role of courts in this area (Stanton, 1997). At the same time, the difference between 'public policy factors' and 'what is just and reasonable' has been referred to as a 'distinction without a difference' (Gosnell, 2000).

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[25] [1990] 2 AC 605.

[26] In *Caparo*, Lord Bridge made specific reference to the fact that 'the law has now moved in the direction of attaching greater significance to the more traditional categorization of distinct . . . situations as guides to the existence, scope, and the limits of the varied duties of care'. In support of this position, Lord Bridge cited *Sutherland Shire Council v Heyman* (1985) 60 ALR 1, a decision of the High Court of Australia.

[27] In *Caparo*, the tripartite test was approved by Lord Jauncey (at p. 655); by Lord Bridge who recast it as a requirement of being 'fair, just, and reasonable' (at p. 618); and Lord Oliver who insisted that it be 'just and reasonable' to impose a duty (at p. 633). The three-pronged test of *Caparo* received endorsement by the House of Lords in *Marc Rich & Co. AG v Bishop Rock Marine Co. Ltd* (1995) 3 WLR 227 (Murphy, 1996).

Proximity is the focus of the *Caparo* court's legal analysis, given that foreseeability is not difficult to establish in many situations. In the U.K., the following conditions must exist for proximity to arise: (a) the professional knew that his or her work product would be communicated to a known third party or a known third-party class; (b) the third party suffered damage as a result of relying on the professional's work product; and (c) the work product was used for the purpose for which it was prepared (Marshall, 1990). The professional's knowledge includes not only actual knowledge but such knowledge as would be attributed to a reasonable person situated as the defendant (Morris, 1991). The knowledge requirement, however, must be met at the time the work product is prepared. In the eyes of the *Caparo* court, the purpose of audited statements is to fulfil the auditor's statutory duty to the shareholders collectively to enable them to monitor management (O'Sullivan, 1993).[28] No duty is owed to stockholders as individual shareholders or third parties.[29]

In reaching this result, the *Caparo* court approved the holding in *Al Saudi Banque v Clark Pixley*,[30] where the court held that proximity (some consider this term a mere label for the existence of a duty of care) required contemplation not only of a particular and identified recipient of information but also of a particular and known purpose for which the defendant would foresee that the information would be relied upon (Chua, 1995). The *Al Saudi Banque* court ruled that the defendant auditors had not rendered their report to their client with the intention or knowledge that the audit opinion would be communicated to the banks (Morris, 1991).

Interestingly, Justice Millett's opinion in *Al Saudi Banque* highlights the difficulty in determining what constitutes proximity: 'In addition, it is necessary to establish a nexus or relationship between the parties sufficient to create a duty of care. The relationship can only be determined by close analysis in each case. The label applied to such a relationship is "proximity", but there is no single definite test.' Thus, *Caparo* and *Al Saudi Banque* are not only important steps in the evolutionary development of auditor liability, but in the law of negligence as a whole. In the context of modern law, incrementalism has to be considered as a restrictive process; it is a particular form of reaction against the approach which would presume the existence of a duty of care in negligence simply on the basis that the harm in question is foreseeable (Stanton, 1997).

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[28] In considering the auditor's liability for negligence, it is useful to focus on any liability arising from an audit performed in accordance with the requirements of the Companies Act. An important distinction relates to the individuals or groups to whom the auditor may be liable. Under the Companies Act, the auditor of a U.K. company reports to the members of the company, but contracts with the company as a corporate entity (Napier, 1998).

[29] The *Caparo* case implies that an auditor can, however, voluntarily assume liability *vis à vis* a third party, but there must be some specific act on the part of the auditor by which liability is assumed, or specific knowledge on the part of the auditor that accounts will be relied on by a nonclient (Napier, 1998). This has led to proposals for so-called 'privity letters' or letters that establish a requisite relationship between auditor and client. In Canada, at least, there is no evidence of these being forthcoming and the profession has obvious reasons for discouraging its members to change the status quo.

[30] [1990] 1 Ch. 313. In this case, the plaintiffs were a consortium of banks who had lent money to Gallic Credit Ltd, a firm which provided import–export trade finance to overseas customers. The defendant auditor rendered unqualified audit opinions on Gallic's 1981 and 1982 financial statements. The banks continued to extend new credit or renew existing credit to Gallic until it went bankrupt in 1983. Justice Millett held the auditor owed no duty of care to any of the banks regardless of whether it was an existing creditor making further advances or a new creditor.

Since *Caparo*, U.K. courts have continued to limit the imposition on auditors of a duty to nonclients for negligent misstatements (Chua, 1995). One example is *James McNaughton Papers Group, Ltd v Hicks Anderson and Co.*,[31] in which the English Court of Appeal found that the auditors owed no duty of care to the plaintiff. The court's opinion identified the important scope of duty factors, which include: (a) the purpose for which the information was prepared and communicated; (b) the relationship between the accountant, client and third party; (c) the size of the class to which the third party belongs; and (d) the extent of the third party's reliance.[32] The *James McNaughton* court noted that in the U.K. a 'restrictive approach is now adopted to any extension of the scope of the duty of care beyond the person directly intended by the maker of the statement to act on it.'

One of the most significant post-*Caparo* decisions is *Morgan Crucible Co. PLC v Hill Samuel Bank Ltd.*[33] The case involved an interlocutory appeal against the decision of Judge Hoffman[34] to refuse to allow the plaintiff to amend its pleading to take account of the *Caparo* decision. The Court of Appeal ruled, as in *Caparo*, that the auditors did not owe a duty of care to the plaintiff before the first takeover bid. In *Caparo*, all the auditor's representations had been made before an identified bidder had emerged. Although the Court of Appeal in *Morgan Crucible* did not decide that a duty of care arose, it indicated such a claim was not bound to fail with regard to the second takeover bid. The reasons were that it was foreseeable the plaintiff would suffer a loss if the profit forecast was inaccurate, the defendant auditors knew the identity of the plaintiff and that the plaintiff intended to rely upon the forecast, and finally, much of the information in the profit forecast was available only to the defendant.

The Court of Appeal distinguished *Caparo* from *Morgan Crucible* on the facts. If the plaintiffs in *Morgan Crucible* had used the information for another purpose, for example, sale of existing shares, it would have been concluded that the information had not been given for the purpose for which the plaintiff had relied on it (Chua, 1995). In such circumstances, *Caparo* would directly apply and no duty of care would arise (Nicholson, 1991; Chua, 1995).

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[31] [1991] 1 All ER 134.

[32] *Caparo* adopts an 'end and aim rule' for negligent misstatement cases: liability should be imposed only where damage is incurred in transactions related to the purpose for which the statement or information is provided (Feldthusen, 1989). One major policy consideration in favour of limiting liability is the chilling effect on the free flow of commercial information upon which a capitalist economy depends. The *Caparo* decision does not mention this consideration.

[33] [1991] 1 All ER 148.

[34] [1990] 3 All ER 330.

Three subsequent cases are worthy of note. In *Galoo, Ltd v Bright Grahame Murray*,[35] an interlocutory appeal involving the plaintiff's complaint, the Court of Appeal addressed the question of whether auditors owed a duty of care to Galoo's majority shareholders (Hillsdown Holdings), thereby raising the issue of third-party liability. Hillsdown had relied on the audited financial statements in making certain loans. Applying both *Caparo* and *Morgan Crucible*, the court held that no duty of care arose because of an absence of evidence (or failure to plead) that the auditors knew that Hillsdown would rely on audited financial statements for making the loans nor that the auditors intended that Hillsdown should so rely. Following the example of Lord Denning, the court restricted third-party liability by focusing on the purpose rather than just the actual or intended users of the auditor's work product.

In *Possfund Ltd v Diamond*,[36] the key legal issue involved whether the common law can recognize a duty of care in the case of a prospectus (containing audited financial statements) for unlisted securities. Justice Lightman ruled that it is arguable that a duty of care is owed to those investors purchasing unlisted securities in the aftermarket. The prospectus issuer (and other parties to the prospectus) must intend such investors to rely on the contents and the investors must actually rely on the prospectus in making their purchases for a duty to arise. Justice Lightman added, however, that a court should think carefully before creating a duty the legislature has withheld. The reasoning in this case is in line with other post-*Caparo* cases. In examining the duty of care issue, a court's focus must be on whether it can be established that the defendant knew that the work product would be communicated to a nonclient, either individually or as a member of a limited class, and the third party relied on such for a specific purpose or in connection with a particular transaction.

Finally, in *ADT Ltd v BDO Binder Hamlyn*,[37] the court ruled that by saying that it stood by the audited accounts, Binder had assumed a legal responsibility to ADT giving rise to a duty of care. This holding is consistent with the judicial reasoning in *Hedley Byrne* and *Caparo*. In the words of Lord Bridge, Binder Hamlyn was 'fully aware of the nature of the transaction which the plaintiff had in contemplation, knew that the advice was communicated directly . . . and knew that it was very likely that the plaintiff would rely on that advice'.

In sum, the *Caparo* decision and subsequent cases narrowed the scope of auditor liability to third parties for negligent misstatements. The auditor of a public firm, absent special circumstances, does not owe a duty of care to an outside investor or an existing shareholder who buys stock in reliance on audited financial statements. Auditor liability for negligent misstatements is confined to cases in which it can be established that the auditor knew that the work product would be communicated to a nonclient, either individually or as a member of a limited class, and the third party relied on the work product in connection with a particular transaction. The current scope of liability would place the U.K. midway between the limited class of users' test and strict privity on Figure 1.

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[35] [1990] 3 All ER 330.

[36] [1996] 1 WLR 1351.

[37] [1996] BCC 808.

*Canadian Third-Party Liability Expansion Period* The leading Canadian case on auditor liability to third parties following the UK's *Hedley Byrne* decision is the Supreme Court of Canada's (the highest court in Canada) 1977 ruling in *Haig v Bamford*.[38] The court considered three possible legal tests that could be applied to invoke a duty of care: (a) foreseeability of the use of and reliance on the financial statements by the suing party; (b) actual knowledge of the limited class of users who will use and rely on the financial statements; and (c) actual knowledge of the specific plaintiff who will rely on and use the financial statements. The first of the three tests is based on 'foresight': what the reasonable man would expect in the circumstances, the familiar test of responsibility for negligence in which physical harm to a person or his property is involved. The remaining tests rely upon 'knowledge': actual appreciation of the facts and awareness that a specific use will result (Fridman, 1976).

The Supreme Court of Canada adopted the 'actual knowledge of the limited class that will use and rely on the statement' test and rejected the 'actual knowledge of the specific plaintiff' test. The most important factor taken into consideration in reaching that decision was the statement's purpose (Ish, 1977).[39] The court balanced the need to protect the public against the need to protect auditors from indeterminate liability, essentially by adopting the rationale of Lord Denning in *Candler* (Blackier and Paskell-Mede, 1999). In *Haig*, the financial statements were actually used for the purpose for which the accountants intended, namely, for decision-making by a lending institution and potential investors.

Significantly, the *Haig* court stated that no distinction exists between the case in which the auditor delivers information directly to the suing party at the client's request and the situation in which the auditor delivers information to the client who, with the auditor's knowledge, passes it to unidentified members of a limited class for use in a transaction of which the auditor is aware at the time the statement is made (Brown, 1977). Arguably, this proposition goes beyond the reasoning in *Hedley Byrne*. The Supreme Court of Canada decided that even though the auditors could not have known the actual identity of Haig (an investor), but rather that a Haig-like limited group existed when they performed their work, that they still owed him a duty of care. At the heart of the issue is not the mere extension of third-party liability in certain circumstances, but the definition of the precise class of persons to whom a duty of care may be owed (Brown, 1977).[40] The *Haig* court left open the possibility of application of the foreseeability test in future cases (Ish, 1977). Thus, under *Haig*, Canada adopted an expansive version of the limited class of users' test (i.e., one without an actual knowledge requirement) which placed it slightly above the limited class of users' test (see Figure 1).

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[38] [1977] 1 SCR 466.

[39] The Court's opinion indicates that the auditors knew that the financial statements were being prepared for the very purpose of influencing a bank, an economic development agency, as well as a limited number of potential investors. The names of the potential investors were not material to the auditors (Ish, 1977).

After *Haig*, Canadian courts followed the development in the U.K. of expanding the scope of duty to third parties in negligence cases in general (Gosnell, 2000). In *Kamloops (City of) v Nielson*,[41] the Supreme Court of Canada adopted almost verbatim the *Anns* two-pronged test. Although the case does not involve accountants, *Kamloops* is considered a hallmark in Canadian jurisprudence because the case introduced a distinctive methodology by offering a principle-based formula whereby duty of care issues could be determined (Gosnell, 2000). However, Canadian courts have applied the *Anns/Kamloops* test in a different fashion than U.K. courts. In fact, the *Kamloops* court itself suggested that the test should be applied on an incremental basis (Gosnell, 2000). Such an approach involves an elaboration of categories where recovery of economic loss is justifiable on a case-by-case basis (Stanton, 1997; Gosnell, 2000). The modified application of the two-pronged *Anns* test and the British retreat from the test in *Caparo* account for the dearth of references in Canadian jurisprudence to U.K. cases decided after 1990 (Gosnell, 2000).

The *Haig* and *Kamloops* decisions are the primary reasons that one leading Canadian legal commentator wrote that the 'ultimate destination will be liability [of public accountants] to all reasonably foreseeable users of such information' (Linden, 1988). Placing such emphasis on reasonable foreseeability evoked an acute fear of indeterminate liability (Ivankovich, 1991).

Following *Kamloops*, despite the lack of any case applying the *Anns* test to auditors, Canadian courts tended toward establishing a broad duty of care in auditor negligent cases (Cheffins, 1991). One reflection of this tendency is the British Columbia Supreme Court decision in *Surrey Credit Union v Willson*.[42] Here the B.C. Supreme Court found that the auditor owed a duty of care to Surrey (a third-party bond purchaser). Although a large class of persons could obtain the prospectus, the court decided that the class was not too large and unidentifiable for a duty of care to arise (Ivankovich, 1991).

In *Kripps v Touche Ross & Co.*,[43] the defendant auditors relied on *Caparo* in arguing that a duty of care should not be imposed since the audited statements were not provided for a specific transaction or to a known, identifiable group of third parties (Wardle and James, 1998). The B.C. Supreme Court (the lower court), with little discussion, determined that Touche Ross owed a duty of care to prospective bond purchasers because the audit firm knew that the purpose of the audit was to facilitate the sale of bonds. Clearly, the court took a broad view of the purpose of audited financial statements and the boundaries of the class of intended users (Wardle and James, 1998). Arguably, the B.C. Supreme Court applied a foreseeability standard in defining the scope of duty of care. Moreover, the scope of duty of care was not an issue on appeal to the B.C. Court of Appeal (Blackier and Paskell-Mede, 1999). Finally, neither the B.C. Supreme Court nor the Court of Appeal made any reference to the *Anns/Kamloops* test in their opinions.

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[40] It is one thing, in a relatively simple situation, to identify a small and discreet group of individuals who are or can be identified as relying directly on the judgment of professionals with whom they have no direct contractual or fiduciary relationship. It is another question altogether, in more complex cases, to contemplate the dimensions of the liability for negligence which may arise where it is known that the opinion and certificates of an auditor or other professional are to be widely disseminated and relied upon by a broad class of persons (Brown, 1977).

[41] [1984] 2 SCR 2.

[42] [1990] 73 DLR (4th) 207.

[43] [1994] 22 BLR (2d) 86 (BSCS), aff'd, [1997] 6 WWR 421.

The failure of the B.C. courts to apply the *Anns/Kamloops* test in *Surrey Credit Union* and *Kripps* is probably attributable to the fact that Canada's highest court had only applied the test in other categories or classes of negligence cases involving economic loss. For example, in *Winnipeg Condominium No. 36 v Bird Construction Co.*,[44] the Supreme Court of Canada reaffirmed the *Anns* formula and repudiated the U.K.'s incremental approach (initiated in *Caparo*). The court recognized that negligence law must develop in the direction of pockets of liability through the medium of five categories of economic loss (Mason, 1997; Stanton, 1997). The five categories are: (a) the independent liability of statutory public authorities; (b) negligent misrepresentation; (c) negligent performance of a service; (d) negligent supply of shoddy goods or structures; and (e) relational economic loss (Feldthusen, 1991). The *Winnipeg Condominium* court reasoned that recoverability for economic loss must be approached with reference to the unique and distinct policy issues raised in each category.

*Canadian Third-Party Liability Turning Point* The turning point in auditor liability in Canada came when the lack of a uniform approach with regard to the duty of care issue was addressed in the 1997 landmark case of *Hercules Managements Ltd v Ernst & Young*.[45] The Supreme Court of Canada applied the two-pronged *Kamloops* (or modified *Anns*) test to determine whether an auditor or other professional owes a duty of care to a third party for negligent misstatements. The first part of the test (or 'at first sight' test) examines proximity, in which it is decided whether the wrongdoer's carelessness might reasonably cause damage to the person suing. If the question is answered affirmatively, part two of the test analyses policy considerations that could curtail or eliminate any duty of care owed by the accountant to the plaintiff (Deturbide, 1998).

Significantly, the Supreme Court endorsed the use of the *Kamloops* test for all types of negligent misrepresentation actions regardless of the type of economic loss or the nature of the defendant. The court rejected the idea that accountants should be subjected to a broader range of liability than other professionals (Rafferty, 1998). The court noted that to create a 'pocket' of negligent misrepresentation cases in which the existence of a duty of care is determined differently from other negligence cases would be incorrect. The application of the modified *Anns* or *Kamloops* test to auditors distinguishes *Hercules* from *Surrey Credit Union* and *Kripps*.

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[44] [1995] 1 SCR 85.

[45] [1997] 2 SCR 165.

With regard to the first prong of the test, auditors and their legal advisers should note that the term 'proximity' means that the professional has an obligation to be mindful of the third party's 'legitimate interests'. Proximity can be said to exist when the auditor or other professional: (a) should reasonably foresee that a third party will rely on the auditor's representation; and (b) reliance by the third party is reasonable. The court noted, however, that mere reliance on an auditor's representation is not, in all circumstances, reasonable. In many cases against auditors, the 'at first sight' test (or first prong of the *Anns/Kamloops* test) will be satisfied and a duty will arise because most third-party users are reasonably foreseeable.

In the second part of the *Anns/Kamloops* test, the court examined policy factors that could serve to limit or eliminate any duty established.[46] The strong emphasis on policy considerations stands in stark contrast to the approach taken in U.K. decisions. The court opinion articulated the undesirable consequences of imposing limitless liability on auditors. Some of the consequences include an increase in liability insurance premiums, a decrease in the supply of accounting services, an increase in the cost of accounting services, and a negative impact on the timeliness of financial information (as auditors would expend more time in the performance of services to reduce the risk of litigation). Another consequence of indeterminate liability would be the creation of a serious logjam of court cases. The court also noted that boundless liability promotes 'free ridership' on the part of relying third parties who lose their incentive to exercise vigilance. In the final analysis, the court indicated that concerns over indeterminate liability will serve to negate any duty owed to nonclients in most cases (Deturbide, 1998).

Some cases will arise, however, where policy considerations involving indeterminate liability will not be a relevant consideration (Rafferty, 1998). For example, if the auditor knows the identity of the nonclient (or a class of third persons) and the auditor's representations are used for the specific purpose or transaction for which they were made, policy considerations will not be important since the scope of liability can be readily circumscribed (the *Haig* scenario). Even if the specific identity or class of potential users is known to an auditor, use of the auditor's work product for a purpose or transaction other than that for which it was prepared or intended could still lead to indeterminate liability. In reaching its conclusion, the

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[46] Some Canadian legal commentators argue that predication of liability on pure foreseeability of economic harm is incompatible with a competitive economic system. A free market system treats many types of losses as legitimate and even beneficial; the economically inefficient deserve to incur certain losses. Once foreseeability of harm is established, to answer the duty question, in any given situation, really involves an inquiry into two broad areas. First, does it make economic sense to shift this type of loss? Second, what do community expectations have to say about whether the plaintiff is reasonably entitled to rely upon the defendant to protect him or her from harm in the particular situation? Such questions are unavoidable and are matters of policy (Cherniak and Stevens, 1992).

*Hercules* court cited *Glanzer* and *Ultramares* with approval. The court interpreted the purpose of the regulatory provision mandating audits under certain conditions as being to assist the collectivity of the shareholders of a corporation in overseeing management, not to assist investors in making personal investment decisions (an equivalent interpretation to that of the court in *Caparo*).

In summary, after the *Haig* decision, some Canadian courts continued to slowly widen the ambit of an auditor's duty to third parties for negligent misstatements. A parallel development was the adoption of the *Anns* two-pronged formula in the *Kamloops* case. However, the *Anns/Kamloops* test has evolved in the direction of pockets of liability through five categories of economic loss. In *Hercules Managements*, the application of the *Anns/Kamloops* test to auditors slowed the expansion of the scope of an auditor's duty to nonclients for negligence. Concerns over indeterminate liability will negate any duty owed to third parties by auditors in most cases. In Figure 1, *Hercules Managements*, with its emphasis on policy reasons to eliminate any duty owed to nonclients, moved Canada below the limited class of users' test toward the strict privity standard.

*Australian Third-Party Liability Expansion Period* Following the *Hedley Byrne* case in the United Kingdom, the first major negligent misstatement decision in Australia was *Mutual Life & Citizens Assurance Co. Ltd v Evatt.*[47] This case did not involve auditor third-party liability but established the first legal test for determining when an auditor or other professional owes a duty of care to a third party for negligent misinformation. In *Evatt*, the High Court of Australia ruled that a person owes a duty of care to another under the following conditions: (a) the one providing the information realizes or ought to realize that the third party is relying on the skill and judgment of the one making the statement; (b) the one making the statement realizes or ought to realize that the third party intends to act upon the information provided; and (c) the third party's reliance upon the information was reasonable.

In *Evatt*, the facts did not involve the typical third-party claim based on misrepresentation. The claim arose from information provided to a third party in response to a direct request from the third party. The potential scope of liability here is therefore relatively narrow. Hence, *Evatt* did not result in an exclusive test of liability for negligent misstatements to third parties (Nicholson, 1991).

Liability for negligent misstatements by a professional appeared to expand somewhat in the 1983 ruling of the Supreme Court of New South Wales in *BT Australia Ltd v Raine and Horne Pty Ltd.*[48] The case provided support for the proposition that a duty is owed to a known third party, even if the professional had no intent to induce reliance by the third party (Davies, 1991). The Supreme Court of New South Wales decided that the plaintiffs ('passive third parties') were owed a duty of care by an appraiser. The issue of duty of care was treated as an extension of the holding in *Hedley Byrne*. Unit purchasers of a trust were deemed by the court to be unidentified members of a limited and known class. The fact that the plaintiffs' reliance was vicarious made no difference (Nicholson, 1991). However, the defendant was aware that the plaintiffs would rely vicariously on his work product at the time professional services were rendered.

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[47] [1968] 122 CLR 556 (HCA), [1970] 122 CLR 268, [1971] AC 793 (PC).

[48] [1983] 3 NSWLR 221.

During 1986, in *San Sebastian Pty Ltd v Minister Administering the Environmental Planning and Assessment Act 1979*,[49] the High Court of Australia seemed to retreat from the proposition (established in *BT Australia Ltd*) that a duty is owed to a known third party even without an intent to induce reliance. The *San Sebastian* court endorsed the principle established in *Jaensch v Coffey*,[50] that the test for a duty of care to arise is reasonable foreseeability plus proximity (Davies, 1991). *San Sebastian* emphasizes that proximity is of vital importance in cases involving pure economic loss. A wide variety of considerations are subsumed under the heading of proximity, including public policy issues (Stanton, 1997). Also, *San Sebastian* made clear that neither the incremental approach nor the *Anns* test was the received wisdom in Australian negligence law relative to the determination of duty question (Swanton and McDonald, 1997).

The High Court appeared to give content or substance to the notion of proximity by noting that a defendant must make a representation with the intent to induce reliance by a third party for a duty of care to arise. A close analysis, however, indicates that the requirement of intent to induce reliance is obiter dicta and thus, not binding on lower courts (Davies, 1991). In *San Sebastian*, the High Court ruled that no duty of care was owed to the plaintiff developer.

Hence, at this point in the evolution of the Australian law of negligent misstatement, it was clear that a duty of care required reasonable foreseeability plus a relationship of proximity. However, the High Court had not given any binding content or identified any definitive factors to establish proximity (Davies, 1991). Thus, lower Australian courts had considerable discretion in deciding what circumstances or conditions created proximity giving rise to a duty of care.

The Supreme Court of Victoria took full advantage of such discretion in 1992 in *R. Lowe Lippman Figdor & Franck v AGC (Advances) Ltd.*[51] At first blush, Judge Vincent held that the auditors owed a duty of care to AGC (Hogg, 1994). This decision was overturned on appeal to the Appeal Division of the Supreme Court of Victoria. The Appeal Division ruled that a duty of care did not arise because the auditors lacked an intent to induce reliance by the plaintiff or a class to which the plaintiff belongs (Hogg, 1994). The court concluded that the evidence showed the auditors' only intent was to discharge their statutory duty required by the Companies Acts.

In reaching its decision, the Appeal Division relied on the dicta (noted above) in *San Sebastian*. One legal commentator argued that the court's application of the *San Sebastian* principle (albeit dicta) to the facts of *R. Lowe Lippmann* was questionable (Hogg, 1994). *San Sebastian* involved a statement made to the public at large whereas *R. Lowe Lippman* involved a set of statements to one, identified creditor. Despite the ultimate ruling in this case, Australian courts still possessed the discretion to impose a broad duty of care on auditors and other professionals.

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[49] (1986) 162 CLR 340.

[50] (1984) 155 CLR 549.

[51] [1992] 2 VR 671.

Later in 1992, the Commercial Division of the Supreme Court of New South Wales also exercised its discretion by expanding the ambit of liability for negligent misstatements in *Columbia Coffee and Tea Pty Ltd v Churchill.*[52] Here the Supreme Court of New South Wales held that the audit manual of Churchill, which stated that nonclients will read and rely on the firm's audit reports, created a duty of care in favour of Donyoke (a puchaser of Columbia shares). The court's reasoning applied to auditors the proposition in *Evatt* that a defendant knew or ought to have known that a third party would rely on the auditor's report.[53] The plaintiff's lawsuit ultimately failed because the plaintiff was unable to establish that there was any causal connection between the accountant's breach of duty and the alleged loss (Hogg, 1994). *Columbia Coffee* moved at least one Australian court to a point on the continuum about midway between the limited class of users' test and the foreseeability standard, as noted on Figure 1.

*Australian Third-Party Liability Turning Point* In 1997, the High Court of Australia ruled directly on auditor liability to nonclients for negligence in *Esanda Finance Corp. Ltd v Peat Marwick Hungerfords.*[54] Interestingly, the High Court judgment, at least in part, has its roots in the early American cases on auditor liability (Osborne, 1998). The *Esanda Finance* decision clarified Australian law which had been uncertain due to conflicting opinions between state jurisdictions (Greinke and Shailer, 1997). A better understanding of this case and the significance of its holding are obtained by an analysis of numerous Australian cases on negligent misstatements in general and on auditor liability to third parties. The High Court decided that mere reasonable foreseeability that third parties might rely on audited financial statements, despite prior court rulings, was insufficient to give rise to a duty of care (Swanton and McDonald, 1997).

In dismissing the negligence claim, the High Court held that a duty of care imposed by mere reference to the foreseeability of harm in the form of financial loss would extend liability beyond acceptable bounds citing Cardozo's opinion in *Ultramares* with approval (Swanton and McDonald, 1997). The court noted that financial loss occurs as a result of legitimate commercial competition and commercial activity would be stifled if the law were to impose a duty of care to avoid that loss. Hence, Australian law requires both foreseeability of harm and a special relationship amounting to a 'relationship of proximity' for a duty of care to arise in cases of pure economic loss.

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[52] (1992) 29 NSWLR 141.

[53] The phrase 'knew or ought to have known' is often used but not with much precision. The phrase is used as if it were roughly synonymous with the phrase 'reasonably foreseeable'. When used with precision, the words signify a kind of halfway house between knowledge and reasonable foreseeability (Davies, 1991).

[54] (1997) 188 CLR 241.

The relationship of proximity can be established in any number of ways. However, mere knowledge by an auditor that his or her work product will be communicated to a nonclient is insufficient to create a duty of care. Also, the High Court refused to endorse the principle that liability of auditors should extend to members of a class whom the auditor knows or ought to know will rely on the audit. A duty of care to a nonclient, absent an auditor's response to a request for information from a specific third party, is difficult to establish unless the auditor intends to induce reliance on the work product by the nonclient or a limited class of nonclients.[55]

In addition, any reliance by the plaintiff must be reasonable under the circumstances (Phegan, 1997). However, the *Esanda* decision contains indications that an appropriate disclaimer by the auditor may serve to negate any intent to induce reliance (Greinke, 1997). If the auditor knows the purpose for which information is supplied to a nonclient and the information is, in fact, used for that purpose (e.g., specific transaction) then intent to induce reliance may be inferred and the third party's reliance will be deemed reasonable. However, a lack of intent to induce reliance is not necessarily fatal to establishing a duty of care because other factors may exist that establish proximity.[56]

The High Court identified numerous policy factors that should be weighed in deciding whether proximity has been established and an auditor owes a duty to a third party. These factors include:

- Liability insurance—the effect on the auditor's ability to obtain liability insurance;
- Supply of services—the likely reduction in the supply of accounting services;
- Standard of care—a possible reduction in auditors' due professional care because of cost-cutting measures implemented to keep audit fees competitive;
- Legal system—the potential adverse effects on the administration of justice in the form of lengthy court hearings clogging the court system if a duty to a large number of third-party users is recognized;
- Investors and creditors—the realization that many plaintiffs are sophisticated and have other means of avoiding risks;
- Cause of loss—the understanding that the auditor's role in the third party's loss is secondary to that of the client;
- Role of audit report—a recognition that the third party is likely to be influenced by a myriad of factors other than the audit report; and

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[55] One Australian legal commentator has argued that it will be seldom, if ever, that an auditor will audit the accounts intending to induce third parties to rely on them or have any reason for wanting third parties to so rely (Davies, 1991).

[56] Certain factors may be identified by the fact that the High Court stressed their absence from the pleadings. These factors are: (a) the maker of a statement may possess skill and competence in the area that is the subject of communication; (b) the maker of a statement has an interest in the recipient of the statement acting in a certain way; or (c) the provider of information may warrant the correctness of the information supplied to a third party (Swanton and McDonald, 1997).

- Unlimited guarantee—the understanding that the imposition of a duty of care would amount to the creation of an unlimited guarantee in favour of nonclients for which auditors receive no payment.

Consideration of underlying influences, including policy factors, offers a firmer basis for future direction of the law than doctrinal conceptualization, which has proved malleable over the last three decades (Phegan, 1997).

In summary, after the *Evatt* case, Australian courts exercised considerable discretion in deciding whether a duty of care arises in negligent misstatement cases. Australian courts have eschewed both the incremental approach of the U.K. and the *Anns/Kamloops* approach of Canada. Instead, Australian courts have focused on the foreseeability-plus-proximity concept. The Australian approach has led to a debate over giving content and substance to the proximity concept in negligent misstatement cases (Stanton, 1997). However, in *Esanda*, the High Court sent a signal that Australian courts should apply a narrower scope of liability in negligent misstatement cases. *Esanda*, with its emphasis on policy factors to curtail or eliminate any duty owed, moved Australia somewhat below the limited class of users' test as depicted on Figure 1.

*New Zealand Third-Party Liability Expansion Period* The leading case on auditor liability to nonclients after the U.K.'s *Hedley Byrne* was the 1978 New Zealand Court of Appeal (the highest court in New Zealand) decision in *Scott Group Ltd v McFarlane*.[57] The main issue on appeal was whether the auditors owed a duty of care to Scott Group, a third-party financial statement user, about whom the defendant auditors knew nothing when the audit report was signed (Johnston, 1978). Despite the auditor's lack of awareness or knowledge concerning Scott Group's reliance, the Court of Appeal held that a duty of care was owed to the plaintiff because it was reasonably foreseeable that someone other than the client might rely on the auditor's work product (Davies, 1991). Foreseeability was deemed the relevant test for the creation of a relationship of proximity. Specifically, the two-pronged test of *Anns* was interpreted in *Scott Group* as establishing a test of proximity based on foreseeability of harm alone. The court found no policy reasons for negating the existence of a duty of care under the second prong of the *Anns* test. In fact, the Court of Appeal rejected the policy argument of indeterminate liability as merely a plea in mitigation to excuse negligent activity because the consequences of liability are too great to justify responsibility (Cawthorn, 1979).

For more than a decade, New Zealand remained steadfast to the *Anns* principle in various types of cases involving pure economic loss. The focus of the New Zealand Court of Appeal had been on the relationship of proximity or first prong of the *Anns* test (Mason, 1997). Thus, in 1978, New Zealand would have been placed at the top of the liability continuum represented in Figure 1.

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[57] [1978] 1 NZLR 553.

*New Zealand Third-Party Liability Turning Point* In the early 1990s, the Court of Appeal began a gradual shift away from foreseeability alone being sufficient for the creation of a relationship of proximity. For example, in *First City Corporation Ltd v Downsview Nominees Ltd*, it was stated that:

> Clearly, we have taken the view that the two broad fields of inquiry are the degree of proximity or relationship between the alleged wrongdoer and the person who has suffered damage—which of course is not a simple question of foreseeability of harm . . . and whether there are other policy considerations tending to negative or restrict the duty in that class of case.[58]

The Court of Appeal reaffirmed the approach of considering factors beyond foreseeability of harm in analysing proximity (as part of the *Anns* test) in *South Pacific Manufacturing Co. Ltd v New Zealand Security Consultants and Investigators Ltd.*[59] Moreover, the *South Pacific* court addressed and rejected the incremental approach of the U.K. because, in the court's eyes, the *Anns* approach was likely to produce the same or similar results (Stanton, 1997).

Another case which indicated a shift away from equating foreseeability with proximity in negligence cases is the High Court decision in *Jagwar Holdings Ltd v Julian.*[60] In that case, the High Court focused on proximity in defining the auditor's duty of care. The court indicated that Jagwar Holdings would have to show that the auditor knew that (a) its work product would be made available to a particular person or class of persons, and (b) that such person or class of persons would rely on the work product for a certain transaction or type of transaction (Watson, 1999). The evidence presented did not satisfy this test. The High Court noted that it had to take into account the dissenting opinion in *Scott Group* in addressing the duty of care issue. Judge Thorp indicated that numerous New Zealand Court of Appeal decisions made clear that foreseeability alone is not sufficient to establish proximity (Watson, 1999). Moreover, the case emphasizes the significance of the role of reliance in establishing proximity in negligent misstatement cases.

Another negligent misstatement case which affirmed the essential role of reliance in demonstrating proximity and, thus, a duty of care is *Brownie Wills v Shrimpton.*[61] The Court of Appeal keyed on the role of *actual* reliance in establishing proximity. The court noted: 'A plaintiff who sues in tort alleging economic loss arising from negligent advice given to the plaintiff by the defendant, including a failure to give advice, needs to prove actual reliance upon the defendant's advice or that the absence of advice . . . led the plaintiff to believe it was safe to proceed'. One aspect of reliance is whether it was induced by the defendant's conduct in assuming or appearing to assume responsibility for advising the plaintiff.

[58] [1990] 3 NZLR 265.

[59] [1992] 3 NZLR 282.

[60] (1992) 6 NZCLC 68, 039.

[61] [1998] 2 NZLR 220.

The Court of Appeal reversed the decision of the High Court and held no duty of care existed because the plaintiff could not demonstrate actual reliance.

In 1999, the Court of Appeal addressed directly the auditor's scope of duty to nonclients for negligence in *Boyd Knight v Purdue.*[62] In this case, the New Zealand Court of Appeal overruled the holding in *Scott Group*. In *Boyd Knight*, a group of investors purchased secured bonds from Burbery Mortgage Finance & Savings, Ltd. The court stated that auditors do not assume a responsibility to anyone other than their corporate client, and through it, its shareholders. Auditors owe no duty to present or future creditors or to those who may be contemplating investing, or further investing, in the company's debt or equity securities. Writing for the court, Blanchard J quoted Lord Denning's dissent in *Candler* that 'accountants owe a duty only to a third person to whom they, themselves, show the accounts, or to whom they know their client is going to show the accounts, so as to induce him to invest money or take some other action on them... Moreover, any duty applies only to those transactions for which the auditors knew their accounts were required.'

The Court of Appeal emphasized that actual reliance on the auditor's work product must be proven by the plaintiff to establish proximity, without which an auditor owes no duty of care under a negligence theory. An auditor has no obligation to a nonclient who has not read and relied on the auditor's work product. Actual reliance refers to a 'specific influence of the financial statements on the mind of the investor', not just a general reliance occasioned by an assumption that an investment is sound because a prospectus contains audited financial statements required by securities regulators.

The *Boyd Knight* decision cites, with approval, the holdings in *Caparo*, *Hercules Managements* and *Esanda Finance*. Consistent with these three rulings, the *Boyd Knight* court took the position that when auditors furnish a report for inclusion in a prospectus they merely express an opinion about the financial statements of the company which they have audited. No duty is owed to an individual investor or prospective shareholder for inaccuracies in information, in the context of a prospectus, without specific, verifiable reliance on the auditor's work product. Where auditors are concerned, New Zealand courts appear to focus on the purpose for which information is provided. This case finally lays to rest the spectre of indeterminate liability which has existed for auditors in New Zealand since *Scott Group* (Watson, 2000). In Figure 1, New Zealand now occupies a spot below the limited class of users' test.

## IS THERE A HOMOGENEOUS COMMONWEALTH LAW OF AUDITOR LIABILITY?

It may be questioned whether substantial differences exist in the results that would be obtained under the *Caparo*, *Hercules Managements*, *Esanda Finance* and *Boyd Knight* approaches to auditor liability. Although the theoretical discussion in the judgments may differ, the basic elements of the actual decisions present a pattern of similarity across the jurisdictions (Mason, 1997). The jurisdictions have, however, supported conclusions with different reasoning.

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[62] [1999] 2 NZLR 276.

In *Caparo*, the United Kingdom rejected the two-stage *Anns* test and reverted to the traditional incremental approach in negligent misstatement cases. Concerns about the scope of the duty of care caused the House of Lords to turn away from the 'modern approach' in favour of 'traditional categorization of distinct and recognizable' situations in attempting to assess such issues. Despite their rejection of policy considerations underlying the *Anns* decision, the justices in *Caparo* and subsequent courts concluded, by necessary implication, if not expressly, that insufficient policy considerations existed to justify an expansion of an auditor's duty of care beyond the bounds of the statutory stewardship purpose as contemplated by the Companies Laws (Blackier and Paskell-Mede, 1999). Moreover, U.K. decisions following *Caparo* continue to consider the elements of foreseeability, proximity, and whether it is fair, just and reasonable to impose a duty of care. The factors considered in deciding what is 'fair, just and reasonable' may not have changed from those considered under the rubric of public policy but instead signal a higher level of caution as to the legislative role of courts (Mason, 1997).

Since the *Kamloops* case, Canada has remained true to a modified version of the *Anns* test which emphasizes that it is the proximity, and not the foreseeability, requirement which governs the operation of the first step in determining liability (Stanton, 1997). Moreover, Canadian courts have applied the modified *Anns* test while recognizing that negligence law must develop in the direction of pockets of liability (Mason, 1997; Stanton, 1997).

The Supreme Court of Canada made clear in *Hercules Managements* that policy factors play a crucial role in deciding whether a duty of care should be imposed. In form, the strong Canadian emphasis on policy factors stands in stark contrast to the pragmatic approach taken in the U.K. At its core, however, the approach in *Caparo* and its progeny rests upon policy choices. Moreover, both nations' courts are consistent with regard to the purpose of an audit report (i.e., to enable the shareholder collectively to assess management's stewardship of corporate assets) (Blackier and Paskell-Mede, 1999).

Traditionally, Australia has taken a unique doctrinal approach to the scope of duty question. Australian courts have eschewed both the incremental approach of the U.K. (Baron, 2000) and the *Anns* test followed by Canada and New Zealand. Instead, Australian courts have stressed the importance of the foreseeability-plus-proximity formula (Davies, 1991; Mason, 1997). The Australian approach has led to a debate over giving substance and content to the proximity aspect of negligent misstatement cases. In fact, the concept of proximity came under attack in *Perre v Apand Pty Ltd.*[63] and *Crimmins v Stevedoring Industry Finance Committee*,[64] both post-*Esanda* decisions (Baron, 2000).

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[63] (1999) 198 CLR 180.

[64] [1999] HCA 59.

In actual results that would prevail, however, the Australian courts are similar to the other three Commonwealth countries. In *Esanda Finance*, the High Court of Australia made clear the importance of policy factors in analysing whether proximity has been established by the plaintiff. Australia shares with Canada a heavy reliance on the use of policy factors in limiting the range of third parties to whom a duty is owed.

Like Canada, New Zealand has adhered to the *Anns* test since the *Scott Group* decision. The Court of Appeal has applied the principles in *Anns* as a single theory of negligence liability, using this as a basis for the imposition of a duty of care in all types of economic loss cases (Mason, 1997). Again, like Canada, New Zealand has shifted toward a view that stresses the significance of proximity, rather than foreseeability, in analysing the scope of duty of care to third parties.

Unlike Canada, in the early 1990s New Zealand courts began emphasizing the role of reliance in establishing proximity in negligent misstatement cases. In 1999, in *Boyd Knight*, the Court of Appeal indicated that an auditor will not owe a duty of care to a third party unless the latter proves actual reliance on the auditor's work product. Thus, New Zealand's courts are in agreement with the U.K. and Canadian courts with respect to the purpose of an auditor's work product and preventing a spectre of indeterminate liability for accountants. However, rather than relying heavily on policy factors (the second prong of the *Anns* test), as does Canada, to circumscribe the scope of duty, New Zealand places weight on actual, specific reliance.

## SUMMARY AND CONCLUSIONS

The shifts in auditor liability must be considered in the context of the social and political environment of the audit profession and tort law in general. The expansion of auditor liability to nonclients from the 1960s through the late 1980s mimicked earlier and concurrent trends in tort law in general and, in particular, in product liability claims. The case made by the audit profession, however, was that the impact of this expansion was both far more threatening to its long-term viability and far less justified than might arguably be the case where products resulted in harm to users. These policy-based arguments were, over time, effective before the courts, and during the last decade the auditing profession has witnessed a trend toward a narrowing of the scope of auditor liability to non-clients for negligence.

The United Kingdom narrowed the scope of an auditor's duty in 1990 in the *Caparo* decision. In Canada, the 1997 decision in *Hercules Managements* arrested the expansionist trend toward a wider scope of auditor liability to nonclients for negligence. Also, in 1997, the Australian High Court continued the trend toward contraction of auditor liability to third parties in the *Esanda Finance* decision. Finally, in 1999 the New Zealand Court of Appeal impliedly overruled the foreseeability rule of *Scott Group, Ltd* with its decision in *Boyd Knight.*

We believe that recent legal developments in the Commonwealth nations represent a convergence toward a narrower scope of auditor liability to third parties for negligence. It is yet to be seen if the trend represents a broader, global trend or even if this particular trend, like its predecessors, is reconsidered. The history of this area of the law is one of continual struggle to find the appropriate balance between respective rights and interests. It is likely too early to state with any conviction that judicial interpretations are locked in any fixed position on the continuum of possible liability outcomes. There always remain broader public considerations fuelling the demand for a shift in the imposition of liability to a position that addresses the concerns not only of auditors but also of users and such policy matters will undoubtedly find themselves once more before courts in leading cases.

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## APPENDIX

## FACTS OF KEY CASES

### *United Kingdom*

*Hedley Byrne & Co v Heller & Partners* A merchant banking firm, provided incorrect data in response to a request from National Provincial Bank for credit information on Easipower Ltd. In reliance on the credit information, Hedley Byrne, the unidentified customer, extended credit for services rendered to Easipower. The latter then went into liquidation. The House of Lords ruled that persons uttering statements owed a duty to any third person with whom a 'special relationship' exists. The defendant escaped liability due to a disclaimer.

*Anns v London Borough of Merton* The plaintiff learned that his home had defective foundations and confronted the choice of either selling the house below cost or investing in expensive repairs. The home-owner sued the local municipality, responsible for enforcing the building code, under a theory of negligence.

*JEB Fasteners, Ltd v Marks Bloom & Co* JEB Fasteners acquired all the shares in a private company having relied on an unqualified audit report produced by accountants Marks Bloom. The financial statements contained numerous errors and thus, the stock acquired by JEB Fasteners was overvalued. JEB Fasteners sued the auditors for damages claiming the provision of negligent auditing services.

*Twomax Ltd v Dickson, McFarlane & Robinson* Investors bought shares in a closely held company. The firm went into bankruptcy shortly after the investors acquired their shares.

*Caparo Industries PLC v Dickman* Caparo Industries owned shares in Fidelity PLC for which Caparo was considering a takeover bid. Caparo received a copy of the 1984 financial statements audited by Touche Ross. Caparo then made a successful takeover bid for Fidelity. Subsequently, Caparo discovered that Fidelity's profits had been overstated. Caparo sued Touche Ross alleging negligent auditing services.

*James McNaughton Papers Group, Ltd v Hicks Anderson and Co* The plaintiff took over its rival, MK, which had been in financial distress. MK's accountants prepared draft financial statements which were shown to the plaintiff.

*Morgan Crucible Co PLC v Hill Samuel Bank Ltd* The plaintiff sued a target firm's auditors and investment bankers. First Castle Electronics, the takeover target, and its investment bankers released a circular stating that an initial hostile takeover bid was too low because it did not place sufficient value on a projected profit rise. First Castle's auditors had issued a letter contained in the circular, stating that the forecast had been prepared in accordance with First Castle's accounting policies. The acquiring firm raised its offer price (the 'second takeover bid') but later claimed the profit forecast was negligently prepared.

*Galoo, Ltd v Bright Grahame Murray* Galoo Ltd was owned by Gamine Ltd. In 1987, Hillsdown Holdings PLC acquired over half of Gamine's shares. Between March 1987 and January 1993, Hillsdown lent over £30 million to Galoo and Gamine. Both companies became insolvent. Galoo sued Bright Grahame Murray, a firm of chartered accountants, alleging that the firm had failed to uncover financial statement fraud committed by Galoo's directors.

*Possfund Ltd v Diamond* Diamond Group's business was the provision and arranging of mechanical breakdown insurance for the purchase of new and used cars. In April 1989, Diamond issued a prospectus, containing financial statements audited by Arthur Andersen, in connection with the sale of common shares on the unlisted securities markets. Plaintiffs were purchasers of shares in both the initial public offering and in the secondary market. Plaintiffs suffered losses of about £935,000, allegedly due to misleading and negligently audited financial statements on which they relied.

*ADT Ltd v BDO Binder Hamlyn* The case arose out of ADT's bid for Brittania Security Group in 1990. BDO and McCabe & Ford had jointly audited Brittania's financial statements for the fiscal year ended June 1989. Prior to making a bid, a BDO Binder Hamlyn partner, knowing ADT would rely on the accounts, confirmed to ADT that the audited financial statements showed a true and fair view of Brittania's financial position. After acquiring Brittania, ADT found that the accounts were misleading and sued Binder Hamlyn.

*Canada*

*Haig v Bamford* The case involved an audit of a privately held firm. The audit report was to be used, with the knowledge and consent of the auditor, to induce a third party (i.e., Haig) to invest in a company (i.e., Scholler Furniture & Fixtures) as a shareholder.

*Kamloops (City of) v Nielsen* A contractor placed house footings on loose dirt in spite of the requirement in approved plans that the foundation be taken down to solid bearing. Kamloops' building inspector issued a stop-work order but construction continued unimpeded. After being finished, the house was sold to Nielsen without notice of its history. After learning that the foundations had subsided, Nielsen sued the vendor and the City of Kamloops.

*Surrey Credit Union v Willson* This case involved the sale of bonds to the public by Northland Bank, the client firm. The auditor consented to the release of an unqualified audit report as part of the bond offer. The evidence at trial indicated that a Surrey Credit Union director, after examining the audited financial statements of Northland Bank, made an oral report to the Surrey board about Northland's financial status. The board itself and the credit union's officers did not examine the financial statements before deciding to purchase Northland's bonds.

*Kripps v Touche Ross & Co* Unsecured bonds were sold to the public by Victoria Mortgage (VM), a publicly traded firm, through a prospectus containing an unqualified audit report asserting compliance with GAAP. The auditors were engaged for the sole purpose of satisfying regulatory requirements with respect to the annual prospectus that VM had to submit to the provincial Superintendent of Brokers. Touche Ross knew that the audited statements were included in the prospectus that was distributed to all prospective purchasers. After issuance of the audit report, VM management altered the financial statements. The prospectus containing the altered financial statements was ultimately issued to the public without Touche consenting to the changes. In 1986, VM was liquidated and numerous bond purchasers sued Touche Ross and others.

*Hercules Management Ltd v Ernst & Young* The plaintiffs were shareholders in Northguard Acceptance Ltd and Northguard Holdings Ltd, companies engaged in commercial and real estate lending. Ernst & Young (E&Y) was originally hired by the Northguard firms to render annual financial statement audits. In 1984, both Northguard companies went into receivership. In 1988, a number of shareholders in the Northguard firms brought suit against E&Y contending that the 1980–2 audit reports, on which they had relied, were prepared negligently.

*Australia*
*Mutual Life & Citizens Assurance Co Ltd v Evatt* This case did not involve auditors.

*BT Australia Ltd v Raine and Horne Pty Ltd* The plaintiffs were investment trust unit owners who relied vicariously (through a trustee), not directly, on information provided by a real estate appraiser. Due to an error committed by the appraiser, existing unit owners who retained or redeemed their units reaped a windfall at the expense of new unit purchasers.

*San Sebastian Pty Ltd v Minister Administering the Environmental Planning and Assessment Act 1979* The Sydney City Council adopted a scheme to redevelop Woolloomooloo in accordance with a plan and documents that were exhibited publicly and operated until abandoned in 1972. In reliance on alleged representations in the documents, the plaintiff developers bought land that later lost value. The developers sued the city council claiming that the documents were negligently prepared.

*R. Lowe Lippman Figdor & Franck v AGC (Advances) Ltd* The plaintiff, AGC (Advances) Ltd, was a finance company that advanced funds to Lyvetta Wearing Mills Ltd in reliance on a negligently prepared audit report. The auditors were aware that the plaintiff was a major creditor and probably would receive a copy of the audit report. Prior to the availability of the audited financial statements, the plaintiff creditor communicated to the auditors by telephone that it required the financial statements for review purposes. The defendant auditor also knew through previous dealings with Lyvetta that AGC was its principal creditor.

*Columbia Coffee and Tea Pty Ltd v Churchill* Columbia Coffee retained the Churchill accounting firm to conduct the 1987 annual audit and an interim audit in late 1987. A firm, Donyoke, relied on the audited statements in making a decision to buy shares of Columbia Coffee. The accountants had no actual knowledge that their reports would be used by Donyoke. The fact that Donyoke was not incorporated when the audit reports were rendered was deemed irrelevant by the court.

*Esanda Finance Corp. Ltd v Peat Marwick Hungerfords* Esanda Finance provided credit to Excel Finance Corp. and a number of its subsidiaries. Excel guaranteed all debt financing provided by Esanda. Excel went into bankruptcy. Esanda filed suit against Peat Marwick claiming losses as a result of a negligent audit.

*New Zealand*
*Scott Group Ltd v MacFarlane* The main issue on appeal was whether the auditors owed a duty of care to Scott Group, a third-party financial statement user, about whom the defendant accountants knew nothing when the audit report was signed.

*Jagwar Holdings Ltd v Julian* The chairman of Jagwar Holdings, Mr Anderson, subscribed to buy common stock in a public offering of Fullers Corporation Ltd. Anderson received a financial package on Fuller which included financial forecasts and an auditor's report signed by Price Waterhouse. Jagwar subsequently agreed to acquire 20 per cent of Fuller. Later, after learning Fuller's true financial condition, Jagwar cancelled its subscription agreement and sued Price Waterhouse for negligence.

*Brownie Wills v Shrimpton* A firm controlled by Mr Shrimpton, one of six directors of Duracrete Holdings Ltd, owned shares in Duracrete. In June 1989, Duracrete arranged an overdraft credit facility, to be personally guaranteed by all six directors, with National Bank of New Zealand. Brownie Wills was a law firm which represented Duracrete but not Shrimpton. Ultimately, only five of the six directors signed the guarantee. Duracrete went into liquidation and the five guarantors had to pay the debt. Shrimpton sued the law firm for negligence and breach of fiduciary duty.

*Boyd Knight v Purdue* A group of investors purchased secured bonds from Burbery Mortgage Finance & Savings, Ltd, between 1 July and 10 August 1988. The purchases were made in response to an offer made in a prospectus that contained a report signed by Boyd Knight, a firm of chartered accountants. Burbery ultimately failed and the bond purchasers, as a class, sued the auditors for negligently failing to detect fraud committed by the CEO. Shareholders' equity was overstated by $1.5 million (N.Z.) on the balance sheet included with the prospectus. At the trial level, the court (Chisholm J) found the existence of a duty of care and the plaintiffs were awarded $375,000.

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